EXHIBIT D

[redacted]

(Public / Redacted Version)

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF TEXAS
MARSHALL DIVISION

BARCO, INC. and BARCO NV, Plaintiffs, v. YEALINK (USA) NETWORK TECHNOLOGY CO., LTD., and YEALINK NETWORK TECHNOLOGY CO., LTD., Defendants.	Case No. 2:23-cv-00521-JRG-RSP JURY TRIAL DEMANDED

EXPERT REPORT OF KEVIN C. ALMEROTH, PH.D.

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I. INTRODUCTION

I, Kevin C. Almeroth, hereby state and declare as follows:

1. I have been asked to review certain issues regarding U.S. Patent No. 10,762,002 (the "'002 Patent")[1], U.S. Patent No. 10,795,832 (the "'832 Patent")[2], U.S. Patent No. 10,904,103 (the "'103 Patent")[3], U.S. Patent No. 11,258,676 (the "'676 Patent")[4], U.S. Patent No. 11,403,237 (the "'237 Patent")[5], and U.S. Patent No. 11,422,951 (the "'951 Patent")[6] (together, the "Asserted Patents") that have been asserted by Barco, Inc. and Barco NV ("Barco") against Yealink (USA) Network Technology Co., Ltd. and Yealink Network Technology Co., Ltd. ("Yealink") in the matter styled above.

2. I am being compensated at my standard consulting rate of $850 per hour of my time spent on this matter. My compensation is not contingent upon the testimony I provide or the outcome of this matter.

II. QUALIFICATIONS

3. I am currently a Professor Emeritus in the Department of Computer Science at the University of California, Santa Barbara (UCSB) with 30+ years of experience. All of my opinions stated in this declaration are based on my own personal knowledge and professional judgment. In forming my opinions, I have relied on my knowledge and experience in designing, developing, researching, and teaching regarding computer networks and protocols, wireless networking, multicast communication, large-scale multimedia systems, and mobile applications.

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[1] BARCO_0002692.
[2] BARCO_0005137.
[3] BARCO_0007517.
[4] BARCO_0008254.
[5] BARCO_0009616.
[6] BARCO_0010815.

4. While at UCSB, I held faculty appointments and was a founding member of the Computer Engineering (CE) Program, Media Arts and Technology (MAT) Program, and the Technology Management Program (TMP). I also served as the Associate Director of the Center for Information Technology and Society (CITS) from 1999 to 2012. I have been a faculty member at UCSB since July 1997.

5. I hold three degrees from the Georgia Institute of Technology: (1) a Bachelor of Science degree in Information and Computer Science (with minors in Economics, Technical Communication, and American Literature) earned in June 1992; (2) a Master of Science degree in Computer Science (with specialization in Networking and Systems) earned in June 1994; and (3) a Doctor of Philosophy (Ph.D.) degree in Computer Science (Dissertation Title: Networking and System Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia System, minor in Telecommunications Public Policy) earned in June 1997. During my education, I took a wide variety of courses as demonstrated by my minors. My undergraduate degree also included a number of courses more typical of a degree in electrical engineering including digital logic, signal processing, and telecommunications theory.

6. One of the major concentrations of my research over the past 30+ years has been the delivery of multimedia content and data between computing devices, including through various network architectures. In my research, I have studied large-scale content delivery systems, and the use of servers located in a variety of geographic locations to provide scalable delivery to hundreds or thousands of users simultaneously. I have also studied smaller-scale content delivery systems in which content is exchanged between individual computers and portable devices. My work has emphasized the exchange of content more efficiently across computer networks, including the

scalable delivery of content to many users, mobile computing, satellite networking, delivering content to mobile devices, and network support for data delivery in wireless networks.

7. An important component of my research has been investigating the challenges of communicating multimedia content, including video, between computers and across networks including the Internet. Although the early Internet was used mostly for text-based, non-real time applications, the interest in sharing multimedia content, such as video, quickly developed. Multimedia-based applications ranged from downloading content to a device to streaming multimedia content to be instantly used. One of the challenges was that multimedia content is typically larger than text-only content, but there are also opportunities to use different delivery techniques since multimedia content is more resilient to errors. I have worked on a variety of research problems and used a number of systems that were developed to deliver multimedia content to users. One content-delivery method I have researched is the one-to-many communication facility called "multicast," first deployed as the Multicast Backbone, a virtual overlay network supporting one-to-many communication. Multicast is one technique that can be used on the Internet to provide streaming media support for complex applications like video-on-demand, distance learning, distributed collaboration, distributed games, and large-scale wireless communication. The delivery of media through multicast often involves using Internet infrastructure, devices and protocols, including protocols for routing and TCP/IP.

8. As a parallel research theme, starting in 1997, I began researching issues related to wireless devices and sensors. In particular, I was interested in showing how to provide greater communication capability to "lightweight devices," *i.e.*, small form-factor, resource-constrained (*e.g.*, CPU, memory, networking, and power) devices. Starting in 1998, I published several papers on my work to develop a flexible, lightweight, battery-aware network protocol stack. The

lightweight protocols we envisioned were similar in nature to protocols like Bluetooth, Universal Plug and Play (UPnP) and Digital Living Network Alliance (DLNA).

9. From this initial work, I have made wireless networking—including ad hoc, mesh networks and wireless devices—one of the major themes of my research. My work in wireless networks spans the protocol stack from applications through to the encoding and exchange of data at the data link and physical layers.

10. Yet another theme is monitoring wireless networks, in particular different variants of IEEE 802.11 compliant networks, to (1) understand the operation of the various protocols used in real-world deployments, (2) use these measurements to characterize use of the networks and identify protocol limitations and weaknesses, and (3) propose and evaluate solutions to these problems. I have successfully used monitoring techniques to study wireless data link layer protocol operation and to improve performance by enhancing the operation of such protocols. For wireless protocols, this research includes functions like network acquisition and channel bonding.

11. As an important component of my research program, I have been involved in the development of academic research into available technology in the marketplace. One aspect of this work is my involvement in the Internet Engineering Task Force (IETF). The IETF is a large and open international community of network designers, operators, vendors, and researchers concerned with the evolution of the Internet architecture and the smooth operation of the Internet. I have been involved in various IETF groups including many content delivery-related working groups like the Audio Video Transport (AVT) group, the MBone Deployment (MBONED) group, Source Specific Multicast (SSM) group, the Inter-Domain Multicast Routing (IDMR) group, the Reliable Multicast Transport (RMT) group, the Protocol Independent Multicast (PIM) group, etc. I have also served as a member of the Multicast Directorate (MADDOGS), which oversaw the

standardization of all things related to multicast in the IETF. Finally, I was the Chair of the Internet2 Multicast Working Group for seven years.

12. My involvement in the research community extends to leadership positions for several academic journals and conferences. I am the co-chair of the Steering Committee for the ACM Network and System Support for Digital Audio and Video (NOSSDAV) workshop and on the Steering Committees for the International Conference on Network Protocols (ICNP), ACM Sigcomm Workshop on Challenged Networks (CHANTS), and IEEE Global Internet (GI) Symposium. I have served or am serving on the Editorial Boards of IEEE/ACM Transactions on Networking, IEEE Transactions on Mobile Computing, IEEE Network, ACM Computers in Entertainment, AACE Journal of Interactive Learning Research (JILR), and ACM Computer Communications Review. I have co-chaired a number of conferences and workshops including the IEEE International Conference on Network Protocols (ICNP), IEEE Conference on Sensor, Mesh and Ad Hoc Communications and Networks (SECON), International Conference on Communication Systems and Networks (COMSNETS), IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS), the International Workshop On Wireless Network Measurement (WiNMee), ACM Sigcomm Workshop on Challenged Networks (CHANTS), the Network Group Communication (NGC) workshop, and the Global Internet Symposium, and I have served on the program committees for numerous conferences.

13. I am a Member of the Association of Computing Machinery (ACM) and a Fellow of the Institute of Electrical and Electronics Engineers (IEEE).

14. Additional details about my employment history, fields of expertise, courses taught, and publications are further included in my CV attached as Appendix A to this Report.

15. Based on my education and experience, I believe I am qualified to render the opinions set forth here.

III. SCOPE OF OPINIONS

16. I understand that Barco asserts the following claims against Yealink in this case (the "Asserted Claims"):

Patent Number	Asserted Claims	Asserted Priority Date
Patent No. 10,762,002	1-7, 10	September 14, 2011
Patent No. 10,795,832	1-4, 6-8, 13-14, 16-19	September 14, 2011
Patent No. 10,904,103	1, 2, 16-17, 19-20	September 14, 2011
Patent No. 11,258,676	1-20	September 14, 2011
Patent No. 11,403,237	1-5, 7-8, 19	September 14, 2011
Patent No. 11,422,951	1-15, 17-21	September 14, 2011

17. I have been asked to opine on and compare the differences of the prior art to the patented features of the Asserted Claims and the technical importance of the patented features over the non-infringing alternatives at the time of the hypothetical negotiation. I understand the hypothetical negotiation date to be September 1, 2020, which is the date of issuance of the earliest Asserted Patents.

18. In forming my opinion, I have reviewed and considered the Asserted Patents and their file histories, as well as relevant evidence produced by Barco and Yealink, including testimony from their witnesses and third-party witnesses, and relevant articles and references. I also reviewed the documents referenced in my report and those listed in Appendix B to this Report. Further, I have relied on my experience and expertise in forming my opinions.

19. My opinions that follow are independent, objective, and based on the facts presently known to me. I reserve the right to supplement this Report, or my opinions therein,

based on material or information that is discovered or provided occurring after the date of this Report.

20. Based on the facts of this case, and the relative advanced nature of the technology and dense competitive space at the time of the hypothetical negotiation, it is my opinion that the patented features of the Asserted Patents would have insignificant technical importance over alternative technologies for reaching the same, or nearly the same, solutions the Asserted Patents purportedly solve.

IV. BACKGROUND

21. I understand Yealink is an innovative technology company which designs, manufactures, produces and sells a variety of products directed to unified communications. I understand Yealink's product lines focus on unified communications and collaboration, such as audio/video conferencing. For example, Yealink has over 100 United States Patents related to audio/video conferencing technology.[7]

22. I understand one of Yealink's largely successful products is its "IP Phone," which is a conferencing phone commonly found in office spaces.[8] However, I understand Yealink also provides a variety of other products directed to the unified communication market, such as the MeetingBoard, MeetingBar, RoomCast, and a variety of microphone, speaker, and camera equipment to support wireless audio/video conferences.[9]

23. I also understand that, prior to April 2024, Yealink marketed and sold a WPP20 Presentation Pod and WPP30 Presentation Pod, which are dongles that enable wireless screen

[7] *See* YEALINK_00011472–YEALINK_00012753.
[8] Discussion with Mr. Cai. *See also* https://www.yealink.com/en/product-list/ip-phone.
[9] Discussion with Mr. Cai. *See also* https://www.yealink.com/en/product-az.

sharing from laptops or other devices. Around the beginning of 2024, I understand that Yealink transitioned from the WPP20 to the WPP30, which is an updated version of the WPP20.[10] It is my understanding that the WPP20 and WPP30 were optional accessories compatible with a variety of Yealink's other products.[11] For example, the MeetingBoard, MeetingBar, and RoomCast could be used individually in a conference arrangement to host a unified communication call, and the WPP20 and WPP30 provided duplicative functionality.[12]

24. I understand that Barco is a technology company that makes, uses, offers for sale, and sells a variety of products, such as computer displays for the medical and healthcare market, projectors for classrooms and/or cinemas, and large scale video walls, as well as supporting products.[13] I understand Barco also provides a wireless screen sharing tool, marketed as the Clickshare Button, which is purportedly covered by the Asserted Patents.[14]

25. Yealink's WPP20 and WPP30 products are at issue in this case.[15] Yealink has admitted infringement of the Asserted Claims.[16] Thus, it is my understanding that the remaining issues in this case relate to the recovery of damages, which Barco asserts is a reasonable royalty for past infringement.[17]

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[10] Defendants' First Supplemental and Amended Responses and Objections to Plaintiffs' First Set of Interrogatories (Nos. 1–10), Response to Interrogatory No. 8.
[11] Discussion with Mr. Cai. Defendants' First Supplemental and Amended Responses and Objections to Plaintiffs' Fourth Set of Interrogatories (Nos. 17-19), Response to Interrogatory No. 19.
[12] *Id*.
[13] Expert Report of Michael C. Brogioli, Ph.D. ("Brogioli Report"), ¶5. *See also* https://www.barco.com/en/products.
[14] *See* https://www.barco.com/en/product/clickshare-conferencing-button.
[15] As I discuss later in my report, the MeetingBoard, MeetingBar, and Roomcast, are also at issue in this case but, however, do not infringe any Asserted Claim individually. Further, only the WPP20 and WPP30 infringe any Asserted Claim individually, and are a necessary element to the infringement of any Asserted Claim.
[16] Defendants' Third Amended Answer and Affirmative Defenses, ECF 85 (May 12, 2025).
[17] Expert Report of William B. Scally, CFA ("Scally Report"), Section 4 – Reasonable Royalty (April 28, 2025); *Compare* Plaintiffs' First Amended Initial and Additional Disclosures *with* Plaintiffs' Second Amended Initial and Additional Disclosures § II.c (withdrawing "Barco seeks damages for its lost profits").

26. On November 14, 2023, Barco filed a complaint against Yealink in the Eastern District of Texas alleging patent infringement of the Asserted Claims.[18]

27. On March 18, 2024, Yealink filed its Answer, Affirmative Defenses, and Counterclaims to the compliant, denying infringement of the Asserted Patents.[19] It is my understanding the denial of infringement was based on the limited discovery available in the case.[20]

28. On April 25, 2024, Yealink announced the withdrawal and recall of the WPP20 and WPP30 in the United States market, issuing a press release made available on its website.[21]

29. On September 20, 2024, Yealink filed a Second Amended Answer and Affirmative Defenses to Barco's complaint to admit infringement of each claim asserted in Barco's Complaint.[22] It is my understanding that the admission was an effort to streamline the case, and to focus resources on settlement rather than the expense of discovery and litigation.[23]

30. On March 12, 2025, Yealink filed a Third Amended Answer and Affirmative Defenses to admit infringement of the Asserted Claims above.[24] It is my understanding that the admission to additional claims was to appease Barco's concerns related to pending *Inter-Parte* Reviews.[25]

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[18] Original Complaint, ECF 1 (Nov. 14, 2023).
[19] Answer, Affirmative Defenses, and Counterclaims, ECF 19 (May 18, 2024).
[20] Discussion with counsel.
[21] BARCO_0052475; https://www.yealink.com/en/product-detail/wireless-presentation-wpp30-eol.
[22] Second Amended Answer and Affirmative Defenses, ECF 47 (Sept. 20, 2024).
[23] Discussion with counsel.
[24] Third Amended Answer and Affirmative Defenses, ECF 85 (March 12, 2025).
[25] Discussion with counsel.

V. LEGAL STANDARDS RELIED UPON

31. Certain legal principles that relate to my opinions have been explained to me by counsel.

32. I understand that Barco seeks a reasonable royalty for Yealink's past infringement.[26] I have been told that a reasonable royalty is a rate at which the parties would have agreed to had they engaged in a "hypothetical negotiation." I have also been told that this hypothetical negotiation is analyzed as of the date that the infringement began. In this case, the earliest Asserted Claims were issued September 1, 2020.[27] It is my understanding that Yealink sold the WPP20 since at least 2018 and the WPP30 since at least 2021.[28] Thus, I consider the hypothetical negotiation date to be September 1, 2020.

33. I also understand the "Georgia-Pacific" factors are fifteen factors commonly used to determine a reasonable royalty rate, as set forth in *Georgia-Pacific Corp. v. The United States Plywood Corp.*, 318 F. Supp. 1116 (S.D.N.Y. 1970). I further understand that Georgia-Pacific factor nos. 9 and 10 are:

> Factor No. 9: Utility and advantages of the patent property over old modes and devices.
>
> Factor No. 10: The nature of the patented invention; the character of the commercial embodiment of it as owned and produced by the licensor; and the benefit of those who have used the invention.

[26] Scally Report, Section 4 – Reasonable Royalty; *Compare* Plaintiffs' First Amended Initial and Additional Disclosures *with* Plaintiffs' Second Amended Initial and Additional Disclosures § II.c (withdrawing "Barco seeks damages for its lost profits").
[27] BARCO_0002692.
[28] Defendants' First Supplemental and Amended Responses and Objections to Plaintiffs' First Set of Interrogatories (Nos. 1–10), Response to Interrogatory No. 8.

34. Thus, I understand it is important to consider the alternative technology available at the time of the hypothetical negotiation (the "Non-Infringing Alternatives"), if any, for reaching similar results as the patented features.

35. I have taken into account these principles in my analysis.

VI. THE ASSERTED PATENTS AND BARCO'S CLICKSHARE PRODUCTS

36. The '002 Patent and the '237 Patent are titled "ELECTRONIC TOOL AND METHODS WITH AUDIO FOR MEETINGS." The '676 Patent and the '103 Patent are titled "ELECTRONIC TOOL AND METHODS FOR MEETINGS." The '951 Patent is titled "ELECTRONIC TOOL AND METHODS FOR MEETINGS BETWEEN TWO USERS." The '832 Patent is titled "ELECTRONIC TOOL FOR COMMUNICATING OVER A COMMUNICATIONS NETWORK."

37. The Asserted Patents all share substantially similar specifications. Note that it is my opinion that the '103 and '832 patents are directed to the peripheral device or dongle itself, and not a system that includes the dongle, like the other four patents. None of the patents are directed to a base unit or receiver alone, *i.e.*, every claim of the Asserted Patents requires at least a peripheral device or dongle. Also, as explained in below in at least §§ IX, X, and XII, Barco did not invent dongles per se. Instead, the patents are directed to specific features of Barco's dongles. There were several prior art dongles available as of the priority date of Barco's patents.

38. Below I describe the '002 Patent, but the description is equally applicable to the remaining Asserted Patents. I will note key differences between each Asserted Patent, when and if it is necessary to understand the subject matter.

39. The '002 Patent is directed to electronic tools for meetings, including methods or devices for use in displaying media content. '002 Patent, at 1:4-9. The '002 Patent recognizes a

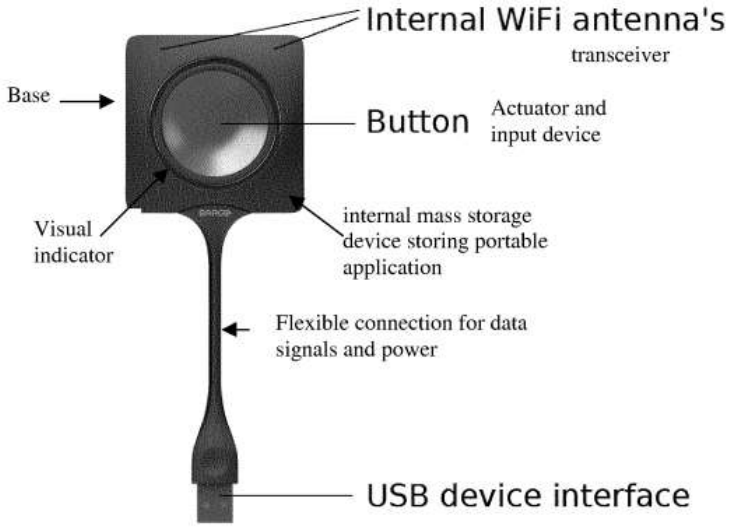
recent "explosion of communication electronic communication tools" allowing ad hoc communication, such as "synchronous and asynchronous conferencing, online chat, Instant Messaging, audio conferencing, video conferencing, data conferencing, application sharing, remote desktop sharing, electronic meeting systems, collaborative management (coordination) tools, project management systems, knowledge management systems, and social software systems." *Id.*, at 1:15-27.

40. The '002 patent acknowledges the known desirability for tools allowing greater participation in a meeting and tools addressing that need. *Id.*, at 2:18-35. The '002 patent purports to improve problems associated with previous meeting technologies such as the "high demands of technical expertise" and "barriers to the use of complicated technology" and the "lack of, or restriction of participation by members of the meeting." *Id.*, at 4:40-53.

41. The '002 Patent discloses a method and/or system to couple a processing device to a network for wirelessly displaying media content to a base node. The processing device can be a user's laptop computer, a smartphone, a tablet etc. *Id.*, at 16:18-20. Each of the processing devices could be a "host device." *Id.*, at 16:20-21.

42. The processing device is connected to a communications network via connection to a peripheral device, also defined as a "connection unit 47." *Id.*, at 16:22-23. The '002 Patent states that the connection units are preferably "physical plug-and-play devices," as shown in FIG. 10. *Id.*, 18:1-3. Alternatively, the connection unit may be "integrated into a user processing device" or "an external peripheral device comprising a connector adapted to couple to a port of" the user's processing device. *Id.*, at 18:4-8. The connection unit has a transceiver for communication with the base node through the communication network. *Id.*, at 18:52-56.

43. The connection units also include an input device, which is preferably a physical actuator coupled to the connection unit, that allows a user action on the input device to initiate the transfer of data from the processing device to the network. *Id.*, at 18:62-67. However, the input device can also be a "key displayed on the client display" of the user's processing device which, when activated by a mouse trigger, for example, can trigger the transfer of the data. *Id.*, at 19:2-6. The connection unit is also "preferably provided with a visual indicator" which can provide feedback on the status of any activity. *Id.*, at 19:7-9. For example, the visual indicator can demonstrate to users that "media content is being sent by that connection unit 47 to the base node 36 for display." *Id.*, at 21:1-4. An example of the connection unit is provided in FIG. 10:



'002 Patent, FIG. 10

44. On the other end of the communications network is the "base or display node 36" which may also be a processing device and which "may be coupled to a second connection unit 49 that provides access the network" to further link all of the processing devices together. *Id.*, at 16:49-55. This second connection unit may be either integrated into the base unit or a separate,

external peripheral device with a connector adapted to couple to a port of the base node. *Id.*, at 18:10-14. The display node "allow[s] display of media" on a display which may be a projector or screen connected to the base or display node. *Id.*, at 16:61-66. The base node has a receiver or transceiver either integrated into the base node or within the connection unit connected to the base node. *Id.*, at 18:56-61.

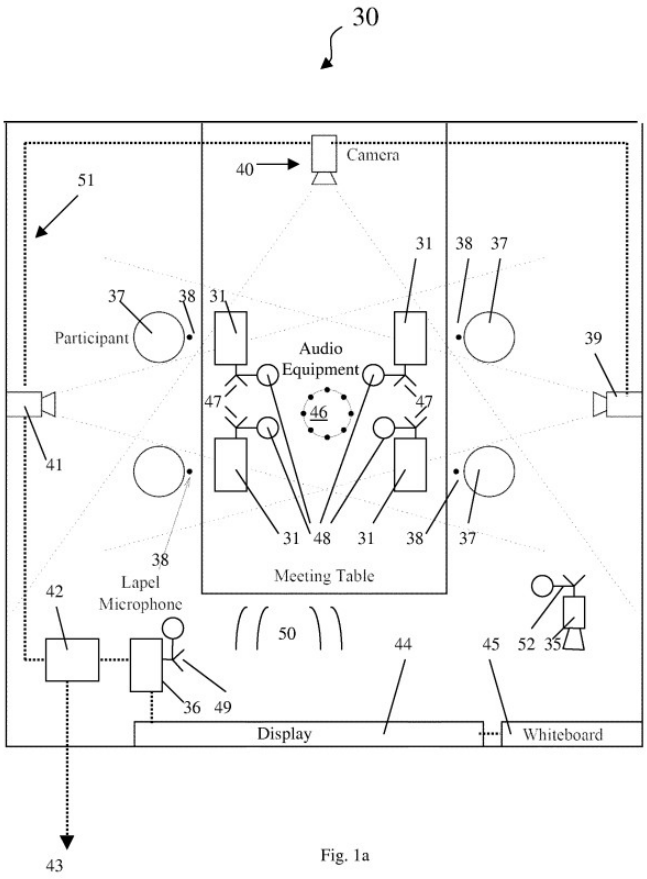


Fig. 1a

'002 Patent, FIG. 1a

45. As shown above in FIG. 1a, the processing devices, connection units, and base node form a "communications network 50 for linking at least one of a plurality of processing devices … and the central display device." *Id.*, at 18:19-23. The specification recites that "[e]ach of the processing devices 31 … has a first connection unit 47." *Id.*, at 16:20-22; *see additionally*, *id.*, at FIG. 1a (demonstrating multiple users 37 each with their own processing device 31 and connection

unit 47). To communicate between devices, the '002 Patent discloses using the "pre-installed generic drivers of the operating system" of the user computing/processing device. *Id.*, at 19:53-57. The pre-installed generic drivers provide a "generic communication protocol" to "communicate[]" between the connection unit/peripheral device and the "relevant processing device." *Id.*, at 19:61-65.

46. FIG. 1b describes an embodiment of the invention:

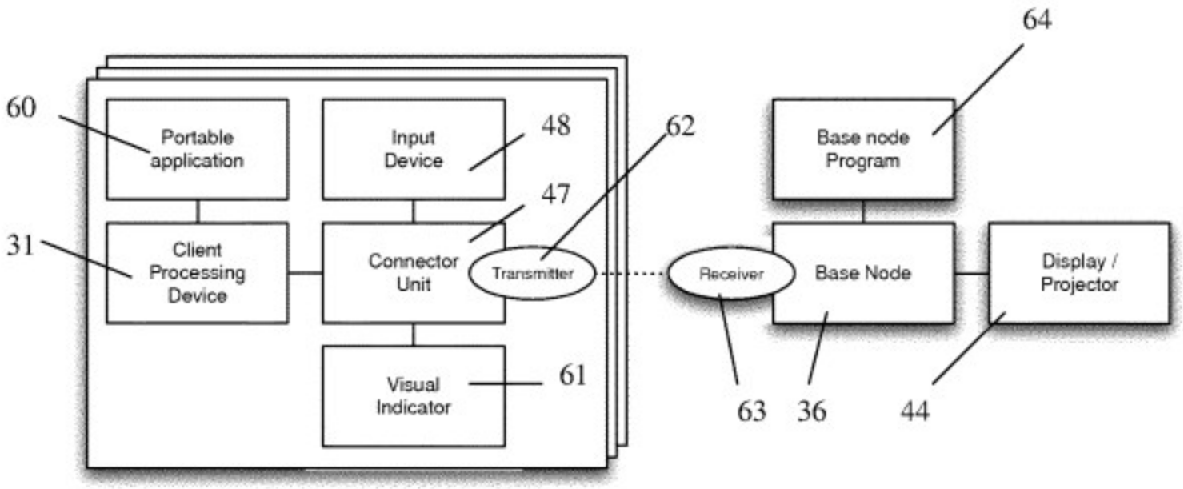


Fig. 1b

'002 Patent, FIG. 1b

47. I understand that the Asserted Patents relate to and purportedly cover Barco's "Clickshare" line of products, including the Clickshare Button as the "peripheral device" claimed in the Asserted Claims. Barco has a variety of "base units" in its Clickshare product line, including the CX-20, CX-30, CX-50, CX-50 Gen2, C-5, C-10, CS-100, CSC-1, CSE-200, CSE-200+, CSE-

800, and CSM-1.[29] Further, I understand Barco released its first video bar, the Clickshare Bar Pro and Clickshare Bar Core, in 2024.[30]

48. However, my review of the Asserted Claims demonstrates that the "base units" are not the patentable invention. I reach this conclusion because no Asserted Patent has any claim directed to the "base unit" individually. I discuss this in further depth below, in Section XIV – Non-Infringing Alternatives. Instead, it is my opinion that the patentable features of the Asserted Patents relate only to the "peripheral device," *i.e.*, the Clickshare Button or dongle.

49. I also understand from Mr. Six's testimony that Barco also makes available an "app-based version of our ClickShare, [and] a mobile version of our ClickShare." Six Dep., 41:7-9. Mr. Six's testimony also makes clear that the app-based ClickShare was available prior to the hypothetical September 1, 2020, date: "Q: So it would have been [available to the public] before January of 2020? A: Yes." Six Dep., 43:5-12. Based on my review of the Asserted Claims, discussed in Section XIV below, the app-based version and/or mobile version of ClickShare would not infringe any Asserted Claim as it this solution does not require a peripheral device, *i.e.*, dongle, to be coupled/connected to a processing device.

VII. NON-ASSERTED BARCO PATENTS

50. The Asserted Patents are in two patent families. I understand a Patent License Agreement between Barco and Crestron Electronics, Inc., discussed in further depth below, concern the Asserted Patents and a third patent family.[31] This third patent family relate to patents similar to the Asserted Patents and includes U.S. Patent Nos. 10,684,972, 11,966,346, and

[29] BARCO_0066656.
[30] Scally Report, ¶13 ("Barco Clickshare Innovations" chart on pg. 5, Year 2024).
[31] BARCO_00052309.

11,966,347. I have provided detailed opinions on these patents in three corresponding IPR petitions, so I am familiar with these patents.

51. I have reviewed the deposition transcript of Erwin Six, who testified about the respective value of the three patent families: "I don't think I can say that one is more valuable than the other."[32] For purposes of my report, and regarding the technical aspects of the patented features, I agree with Mr. Six's opinion that the three families can be viewed as equal in value. However, while I agree that each is equal in value to the others, I do not agree that the patented features provide substantial value over the prior art or alternative technology available. I discuss this issue in more depth below.

VIII. LEVEL OF ORDINARY SKILL IN THE ART

52. In this case, Barco alleges that a person having ordinary skill in the art at the time of the alleged invention ("POSITA") would have had at least a Master's Degree in Electrical Engineering and five years of work experience in computer science and embedded systems, or a Master's Degree in Computer Science and five years of work experience in electrical and computer engineering and embedded systems. Additional educational experience could substitute for some of the work experience. For the purposes of this declaration, I accept as true Barco's alleged level of the POSITA.

53. As of the time of the invention of the Asserted Patents and through today, I qualify as a person of ordinary skill in the art.

[32] Six Dep., 142:13–144:5.

IX. BACKGROUND OF THE ART

54. Screen sharing technology is used to communicate and collaborate, making it possible to share content seamlessly across different devices and platforms. This technology enables users to display their screens to others, facilitating presentations, remote assistance, and collaborative work. There are several prior art and alternative screensharing technologies.

55. Skype, one of the earliest platforms to include screen sharing capabilities, was first released in August 2003. Initially, Skype focused on enabling voice and video calls over the internet, providing a revolutionary way for people to communicate across vast distances. However, as the technology evolved, Skype recognized the growing need for enhanced remote communication tools. As a result, screen sharing features were later added to the platform, allowing users to share their screens during calls, facilitating presentations, remote assistance, and collaborative work. https://web.archive.org/web/20151128100316/http://www.skype.com/en/ ("Skype Webpage (Archived Nov. 28, 2015)").

56. The process for sharing a screen on Skype was designed to be user-friendly and efficient. Users could initiate a screen sharing session by clicking the screen sharing button within the call interface. This action would prompt Skype to capture the user's display and stream it in real-time to the other participants in the call. The recipient could then view the shared screen, enabling them to follow along with presentations, troubleshoot issues, or collaborate more effectively.

57. Skype's screen sharing technology utilized the pre-installed generic drivers of the operating system, which provided a generic communication protocol to facilitate the interaction between the connection unit or peripheral device and the relevant processing device. This approach ensured seamless compatibility with various operating systems and devices, making the screen sharing feature accessible to a broad user base. The introduction of screen sharing on Skype

marked a significant milestone in the evolution of remote communication, setting the stage for more advanced and integrated collaboration tools that would follow in its wake.

58. Zoom emerged as a key player in the video conferencing and screen sharing market. Launched in April 2011, Zoom gained popularity for its ease of use and reliable performance, providing high-quality video calls and robust screen sharing functionalities. https://www.zoom.com/en/about/.

59. Slack, a collaboration hub for work, introduced screen sharing in its platform to boost productivity. Initially released in August 2013, Slack integrated screen sharing to allow team members to share their screens during video calls or in dedicated channels. https://www.britannica.com/technology/Slack.

60. Wired video screen sharing typically involves HDMI or VGA cables to connect a computer to a display. Wireless screen sharing technologies have evolved to eliminate the need for physical cables. Examples include Miracast and AirPlay, which enable users to share their screens wirelessly across compatible devices.

61. Miracast, developed by the Wi-Fi Alliance, was introduced in September 2012. It uses Wi-Fi Direct technology to allow devices to connect and share screens without the need for a router, providing a seamless and cable-free experience. https://www.engadget.com/2012-09-19-wi-fi-alliance-announces-first-miracast-certified-devices.html.

62. AirPlay, an Apple technology, was first launched in November 2010. It allows users to stream audio and video from their Apple devices to compatible receivers like Apple TV, supporting screen sharing across the ecosystem of Apple products. https://www.cultofmac.com/news/september-ipod-event-in-ios-4-2-airtunes-becomes-airplay.

63. Surfly, a co-browsing technology, enables shared web browsing sessions without the need for downloads or installations. It was founded in 2012 and provides a secure and efficient way for customer support and real-time collaboration on web content. https://www.surfly.com/about.

64. Vivitek sells a BYOD presentation solution that includes a dongle for up to four people to share content simultaneously. https://www.amazon.com/Vivitek-NP2000US-Wireless-Presentation-Collaboration/dp/B01DOA45DK.

65. Crestron sells BYOD products including base units and dongles for sharing user's screens. The following section discusses the Crestron products in more detail.

X. CRESTRON PRODUCTS

66. I understand Crestron Electronics, Inc. entered a Patent License Agreement with Barco for the Asserted Patents [redacted][33] Below are examples of Creston products:

67. The products above are, starting on the left, the AM-3100 receiver, the AM-3200 receiver, and the AM-TX3-100 connection adapter. [redacted].[34] [redacted]

[redacted]

[33] BARCO_0052309; Scally Report, "Crestron License Agreement Term Key Terms" chart, pg. 19.
[34] BARCO_0052309.

[redacted].[35] [redacted]

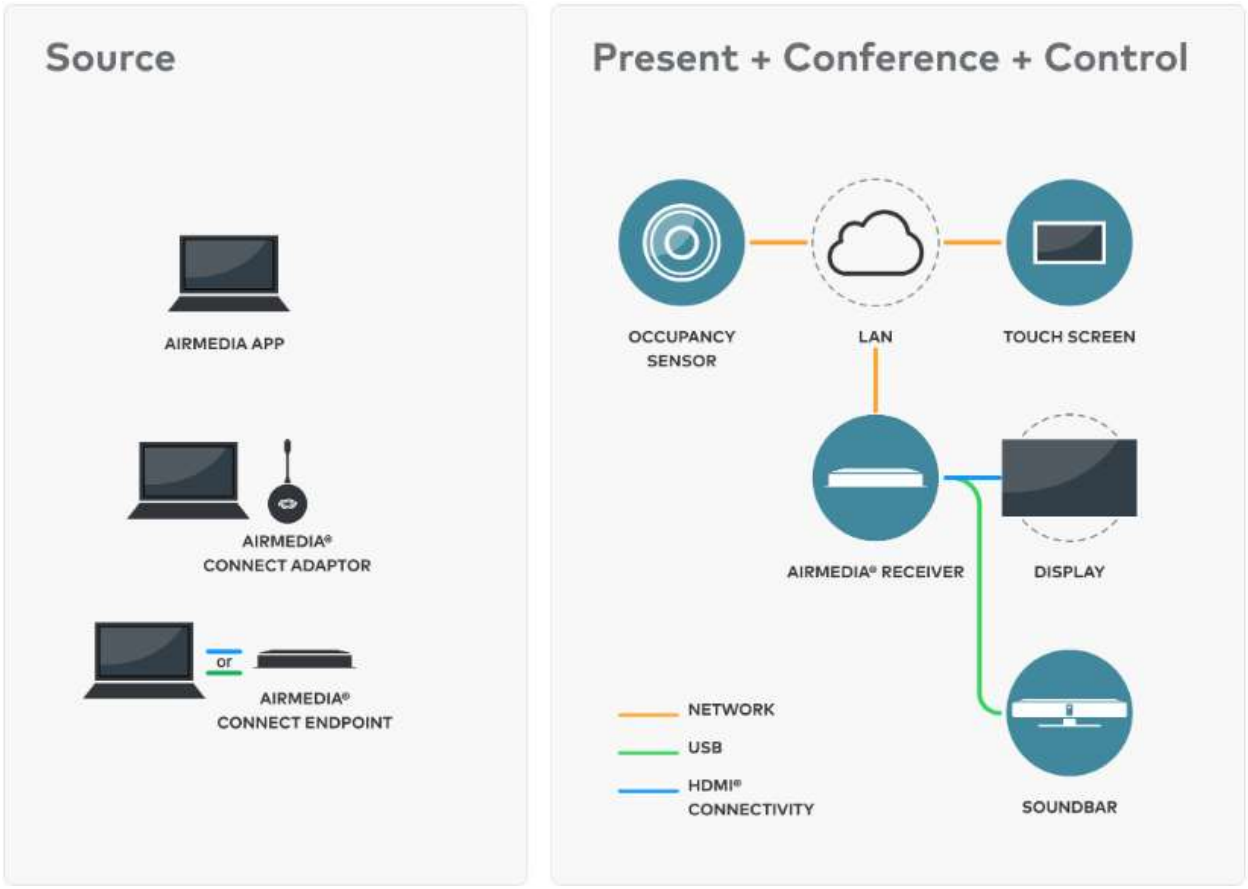
[redacted]

68. The above Crestron products are part of Crestron's "AirMedia" product line.[36]

69. I have reviewed the testimony of [redacted], a program manager at Crestron. [redacted].[37]

70. [redacted].[38] [redacted]:[39]

[35] BARCO_0052309 at 52310.
[36] *See* https://www.crestron.com/Products/Featured-Solutions/AirMedia.
[37] https://www.crestron.com/Partners/Integrated-Partners/Microsoft.
[38] https://www.crestron.com/Products/Workspace-Solutions/Unified-Communications/Crestron-Flex-Tabletop-Conferencing-Systems/UC-BX31-T.
[39] https://www.crestron.com/Products/Featured-Solutions/AirMedia.



71. This illustration further confirms my opinion that alternative technologies existed at the time of the hypothetical negotiation for sharing audio/visual content from a processing device without a dongle. For example, in the illustration above, I note that Crestron describes the possible "Source" as the "AirMedia App" or the "AirMedia Connect Endpoint." Neither alternative requires a "dongle."

72. My review of [redacted] testimony further confirms my opinion:[40]

[redacted]

[40] [redacted]., 23:13-21.

[redacted]

73. I further reviewed Crestron's product offerings through the WayBack Machine, and found that Crestron offered the "AirMedia 2.0 app," which could be deployed "to personal computers across the enterprise." Through this downloadable application, "everyone in your organization is ready and able to connect to any approved AirMedia 2.0 device with just a single mouse click." This WayBack capture was taken August 11, 2020, just prior to the hypothetical negotiation date.[41]

74. I further found a Crestron press release that AirMedia 2.0 was debuted to the public in or around 2018. This iteration of the app allowed people to "easily connect their smart devices and laptops to the room display…. No more wires or dongles cluttering the table."[42] In fact, it appears the AirMedia application technology was available well-prior to Barco's alleged invention. For example, the original AirMedia "free app" allowed users to "present wirelessly to a projector or HD display" and was originally debuted in or around 2013.[43]

75. Thus, as explained below in Section XIV, it is my opinion that Crestron offered a non-infringing alternative to the Asserted Patents at the time of the hypothetical negotiation.

[41] https://web.archive.org/web/20200811191423/https://www.crestron.com/Products/Featured-Solutions/AirMedia.
[42] https://www.crestron.com/News/Press-Releases/2018/000.
[43] https://thejournal.com/articles/2013/06/13/crestron-airmedia-turns-mobile-devices-into-presentation-systems.aspx.

XI. LACK OF DIRECT INFRINGEMENT FOR THE BASE UNIT ALONE

76. I understand that each claim of the Asserted Patents expressly requires a "peripheral device" to infringe, as shown in ¶123 of this report. Therefore, it is my opinion that an infringing device, system, or method requires a peripheral device, which itself requires a base unit to infringe.

77. I have reviewed Dr. Brogioli's report and do not see any evidence of direct infringement by a system with a base unit and no dongle. Therefore, we agree that a base unit by itself cannot infringe the Asserted Patents

78. A peripheral device has no use without a base station or receiver because there is nothing for the peripheral device to transfer media content to. A base unit, in contrast, has uses without a peripheral device because it can work directly with a processing device, *e.g.*, laptop, without any peripheral device. Therefore, Dr. Brogioli did not and could not allege infringement by the base station itself.

79. I explained above that the Crestron base unit has substantial noninfringing uses. The same is true for the accused Yealink base units.[44] Yealink's base units are compatible with third-party unified communication systems, such as Teams and Zoom.[45] Therefore, the accused base units have substantial non-infringing uses.

XII. ALLEGED DIFFERENCES BETWEEN THE ISSUED CLAIMS AND THE PRIOR ART

80. I have provided opinions in IPRs of four of the Asserted Patents. The Patent Trial and Appeal Board ("PTAB") found that all of the independent claims and most of the dependent claims of those four patents are more likely than not unpatentable. Therefore, the validity of the

[44] Defendants' First Supplemental and Amended Responses and Objections to Plaintiffs' Fourth Set of Interrogatories (Nos. 17–19), dated April 18, 2025, pp. 4–6.
[45] The Cai Deposition, p. 48, lines 16–25; and p. 49, lines 1–17; *see also* Scally Report, ¶107.

independent claims is substantially in doubt, and only a few narrow dependent claims would remain if the PTAB eventually cancels the instituted claims.

81. The prior art of screen sharing technology was dense as of the Asserted Patents' priority date. Skype was an early mass-market product that allowed for video conferences and screen sharing.[46]

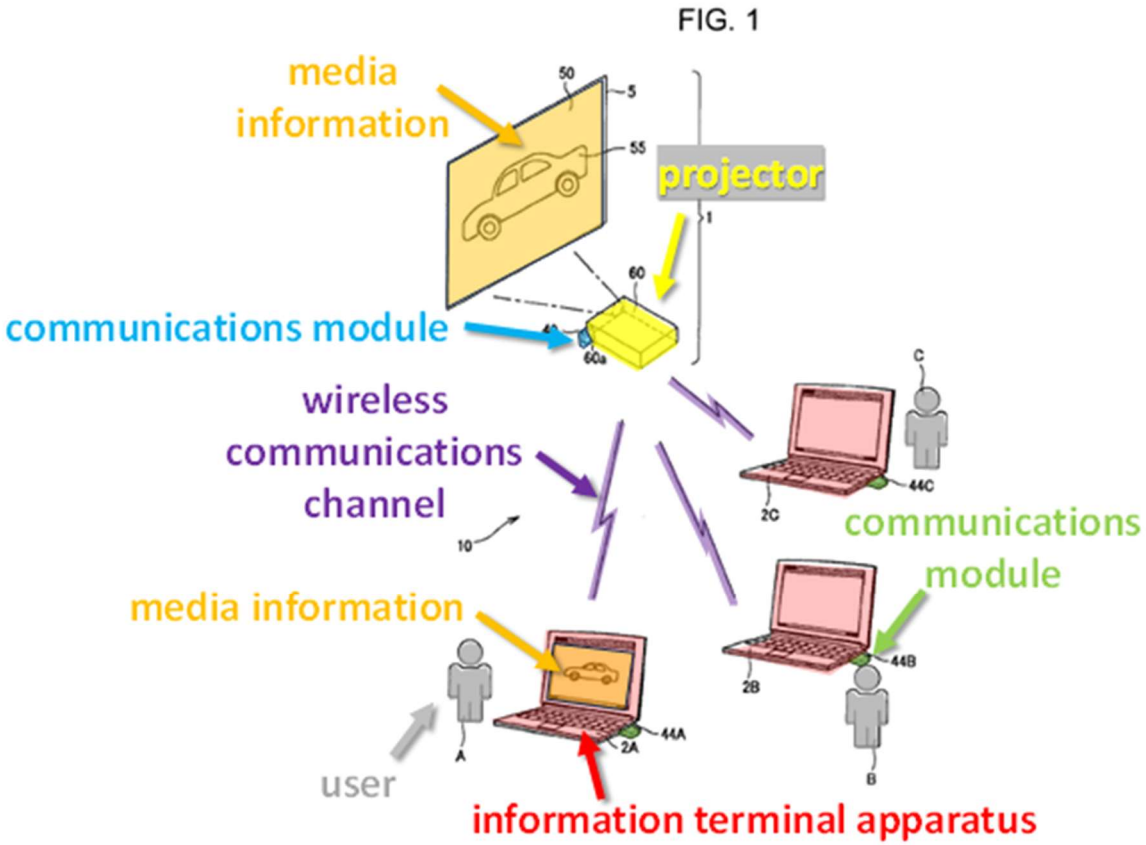
82. The prior art also contained many examples of dongles or peripheral devices that could be connected to computers via data ports, including RS-232, USB, and PCMCIA. In fact, PCMCIA was developed as an early peripheral interface for adding memory or functionality, such as Wi-Fi communication.[47]

83. Below are several relevant prior art references demonstrating the ubiquity of content sharing systems using dongles.

A. U.S. Patent Application Publication No. 2005/0210390 ("Ono")

84. Like the '676 patent, Ono describes display system including display apparatus (*e.g.*, projector and screen) that receives images transferred from multiple information terminal apparatus (*e.g.*, personal computers (PCs)) connected via a wireless network. Ono, ¶2. The system can switch among PCs and display information from the PC chosen. Ono, ¶7. Ono's system uses a communications module 44 and wireless network to connect to communications module 40 coupled to an image display apparatus 1. Ono, ¶36.

[46] https://web.archive.org/web/20151128100316/http://www.skype.com/en/ ("Skype Webpage (Archived Nov. 28, 2015)").
[47] https://web.archive.org/web/20081225064415/http://pcmcia.org/ (December 25, 2008)



Ono, FIG. 1.

B. Japanese Patent Application Publication No. 2008-165007 ("Uchida")

85. Like the '676 patent, Uchida describes connecting an image projection device to a computer device via a wireless communication channel. Uchida, abstract. Uchida uses a wireless device, such as a USB dongle, which connects to computer device through a USB connector. *Id*., ¶39. Using the wireless device, Uchida's system is able to transmit image data from the computer device, through the wireless device, and to the image projection device where the image may thereafter be projected onto the screen of the image projection device. *Id.* Further, Uchida discloses that wireless device has a storage unit capable of storing wireless setting information and an image

transfer application, which automatically configures the wireless settings of the computer device to connect to the image projection device and transfer image data. *Id*., ¶42, 48.

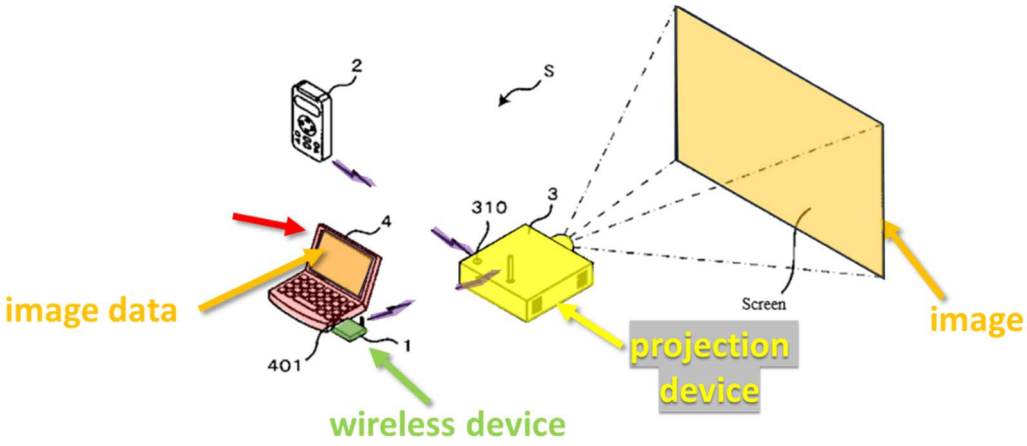


FIG. 1 (Ex. 1009)

Id., FIG. 1.

C. U.S. Patent Application Publication No. 2011/0096138 ("Grimshaw")

86. Grimshaw discloses a wireless presentation system that includes separate user modules having buttons or actuators that allows a user to begin presenting. Grimshaw, ¶¶4, 19 ("the users of modules 14, 16, 18, 20 can take control of the display module 22 by respectively engaging buttons 344, 354, 364, 374, which causes switch controller 318 to pass the data signals from the selected user module on to the display module"), 20, 27-28, FIG. 1.

D. U.S. Patent Application Publication No. 2010/0295994 ("Kaplan")

87. Like the '002 patent, Kaplan discusses transmitting video content between a computing device and display device that provided numerous benefits over alternative systems. Kaplan, abstract; EX-1002, ¶¶84-86. Kaplan's communications system 100 describes that a computer 220 is wirelessly connected to a display device 210 via a USB transmitter 120. *See, e.g.*, *Id*., ¶¶16-18 and FIG. 2, reproduced below. The transmitter 120 and a receiver 110 come pre-

paired, with the receiver 110 further being connected to the display device 210—therefore, the process avoids requiring an end-user to configure the wireless connection. *Id*., ¶18; EX-1002, ¶85. In Kaplan's disclosed system, "the user may select a video to be played and the selected video footage may be transmitted from the computer 220 through the transmitter 120 to the receiver 110 and then displayed on the display device 210." *Id*., ¶28.

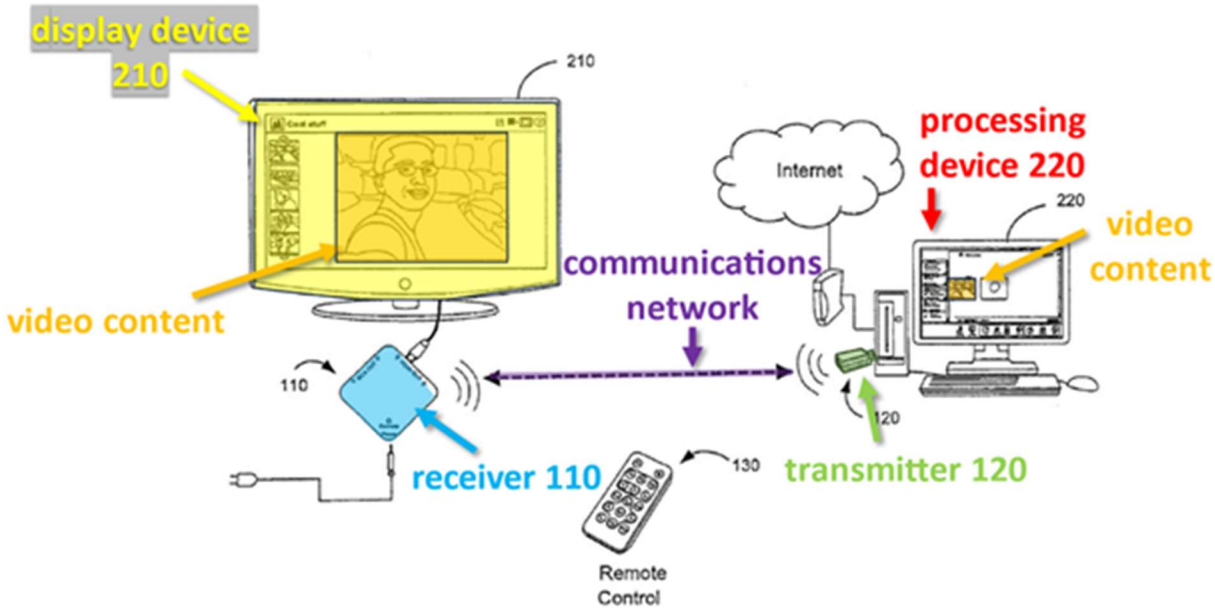
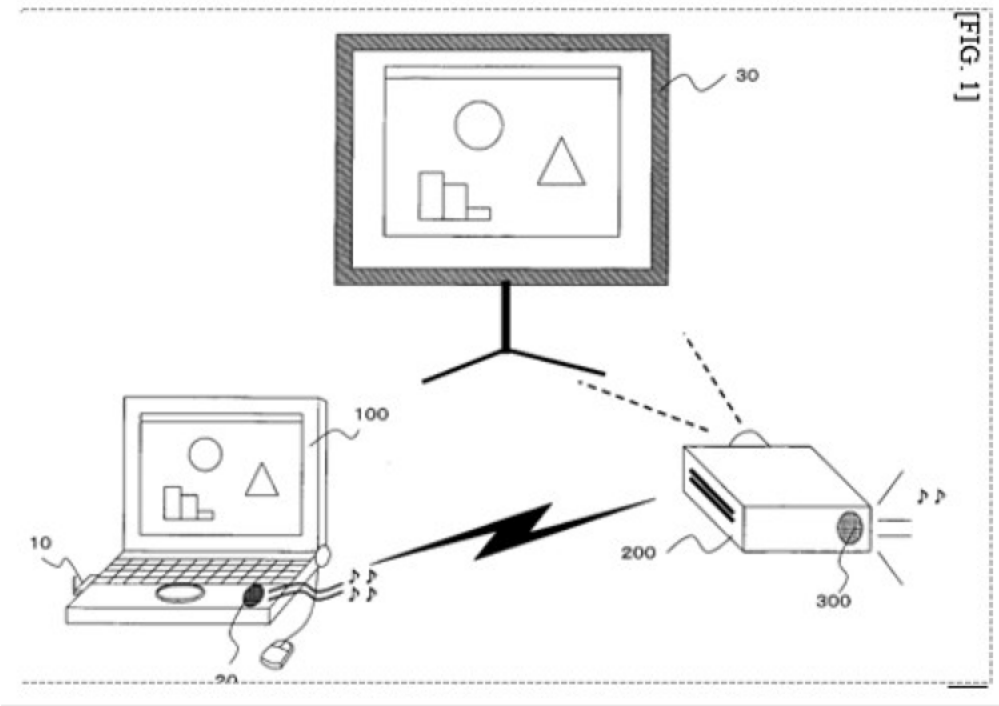


FIG. 2

Id., FIG. 1.

E. Japanese Patent Application Publication No. 2007-208606 ("Maeda")

88. Like the '002 patent, Maeda recognized common issues with alternative systems and, thus, discloses a separate system using a personal computer (PC) to generate images and audio and which transmits such data to a projector using a wireless local area network (LAN). Maeda, ¶3, 15. In operation, the "screen displayed on the display of PC 100 is transmitted from PC 100 to projector 200 and the screen received by projector 200 is projected onto a screen 30. A wireless LAN card 10 containing a wireless LAN chip is attached to PC 100, thereby transmitting image signals and audio signals to projector 200 via the wireless LAN." *Id*., ¶17.



Id., FIG. 1.

F. International Patent Application Publication No. 2006/113711 ("Ahmed")

89. Like the '002 patent, Ahmed is directed to wireless, real-time transmission of data from a source to a monitor and the automatic configuration of a wireless device. Ahmed, abstract. Ahmed's computing device 101 (such as a PC) communicates, via wireless network 102, with remote monitor 103 (such as a TV) using a "processing system on a chip capable of wirelessly transmitting and receiving graphics, [and] audio" and which may be "incorporated into a standalone device that is in wired communication with the remote monitor 103 or computing device 101." *Id.*, 7:6-22.

90. Further, software module 301 is capable of capturing media in real time while it is playing on the computing device and temporarily stores the captured media in the buffer before compressing it and preparing it for transmission. *Id.*, 8:18-22. Thereafter, a receiver 400, comprising a transceiver 401, a display device 403 for rendering the video media and an audio

device 404 for rending the audio data, receives the transmitted video and audio media. *Id.*, 8:24-29. Ahmed further discloses that it preferably uses a hybrid TCP/UDP transmission protocol to transmit the video and audio data in separate streams. *Id.*, 19:16-19.

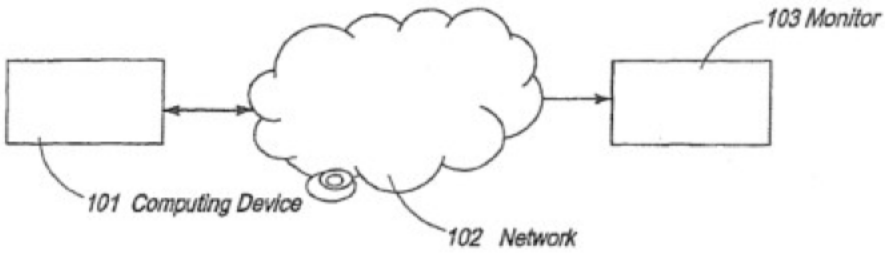


FIG. 1

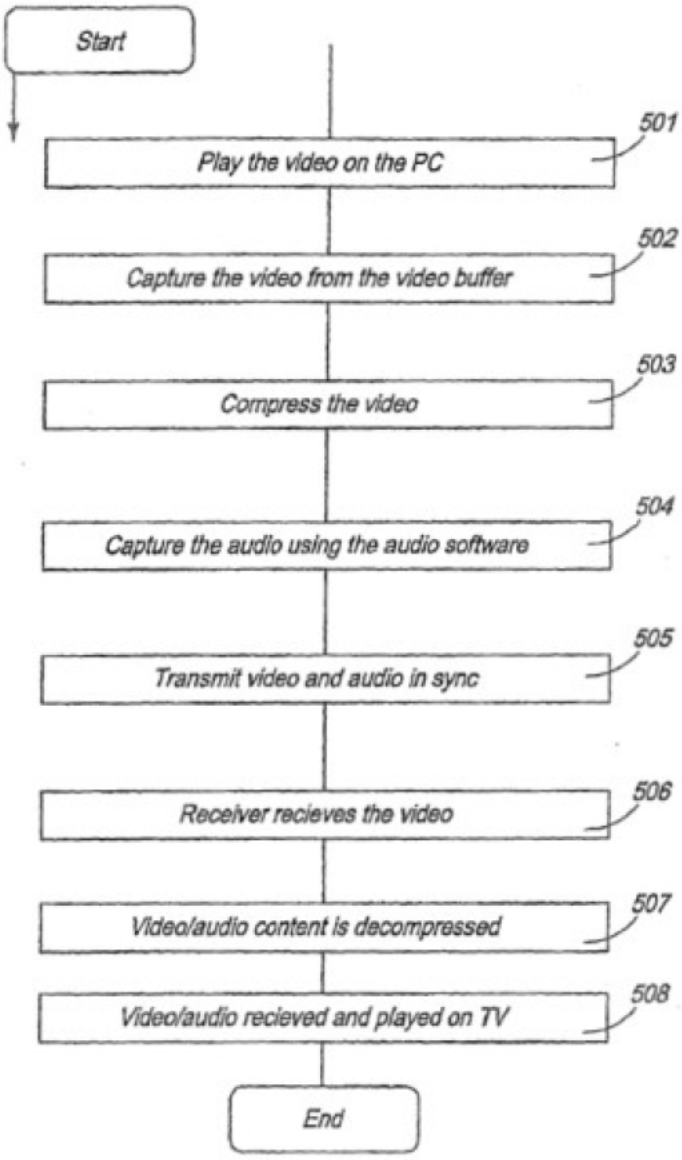


FIG. 5

Id., FIGs. 1, 5.

G. EP Patent Application Publication No. 2107463 ("Deforche")

91. Similar to the '002 patent, Deforche connects a host computer to a wireless communication network via "at least one pre-installed generic driver providing a generic communications protocol (7) for communication between the host computer device and a standard class of computer peripheral devices." Deforche, abstract. Deforche defined a "pre-installed

generic driver" as "a driver which is installed on the computer device along with the installation of the operating system, *i.e.* a driver which is standard for the operating system and which is capable of driving a standard class of computer peripheral devices connected to the computer device without requiring installation of a specific driver….[such as] a human interface device (HID)….[or] a mass storage device (MSD) driver." *Id*., ¶10. Notably, Deforche notes how "HID and MSD drivers [were] known per se in the art." *Id*., ¶10.

92. In operation, the "[d]ata traffic from the computer device towards the wireless communication network and vice versa is routed over this modem/host communication interface and uses the generic communication protocol provided by the pre-installed generic driver." *Id*., ¶9. According to Deforche, its disclosed method provided additional benefits over alternative systems, specifically, in that users avoided the "need for a specific driver for the communication between the wireless modem device and the computer device" to be downloaded/installed, increasingly important for users with restricted user rights, *i.e.*, user rights do not allow for installation of the necessary driver to the device, and that the method leaves "zero footprint, *i.e.* the wireless modem device "leaves no trace … on the computer device." *Id*., ¶¶9, 16.

H. U.S. Patent Application Publication No. 2008/0074560 ("Ichieda")

93. Ichieda describes an image display system 1 including a projector 50 which connects to information terminals 8080a-80d (*e.g.*, mobile phones) over a wireless LAN. Ichieda, ¶43, FIG. 1. To wirelessly connect, each phone captures an image of a barcode displayed by projector on a screen. *Id.*, ¶75-91, FIG. 3-4. The barcode is then used to route image data (displayed on the phone) to particular area Aa-Ad on the screen where the barcode appeared. *Id*. Once connected, the phones 80a-80d transmit an image signal to the projector 50 via the wireless LAN. *Id.*, ¶44, FIG. 1.

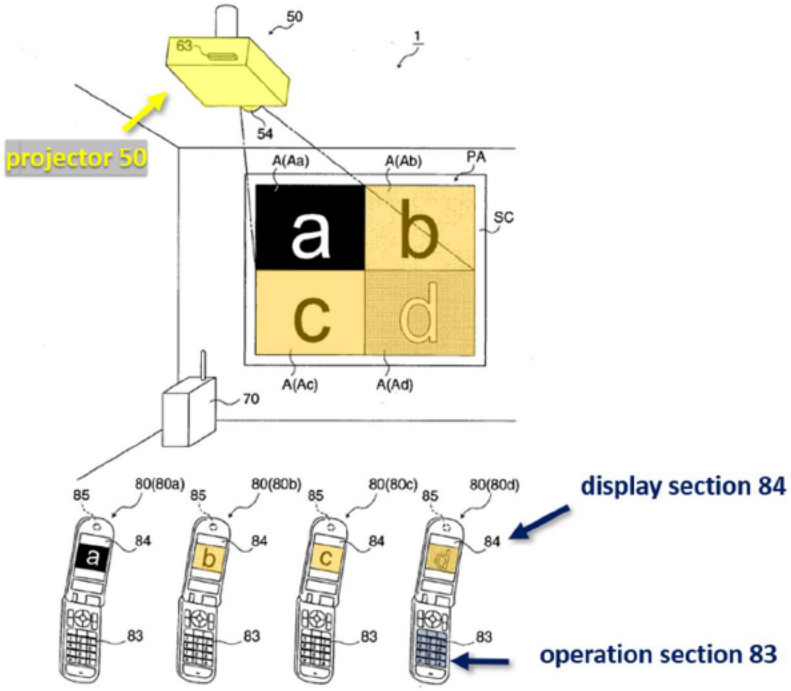


FIG. 1

Id., FIG. 1

94. In another embodiment, the phone is connected to a laptop PC 90 and the images displayed on the laptop display section 94 are sent to the projector using a similar connection method. *Id.*, ¶¶129-150. FIG. 11.

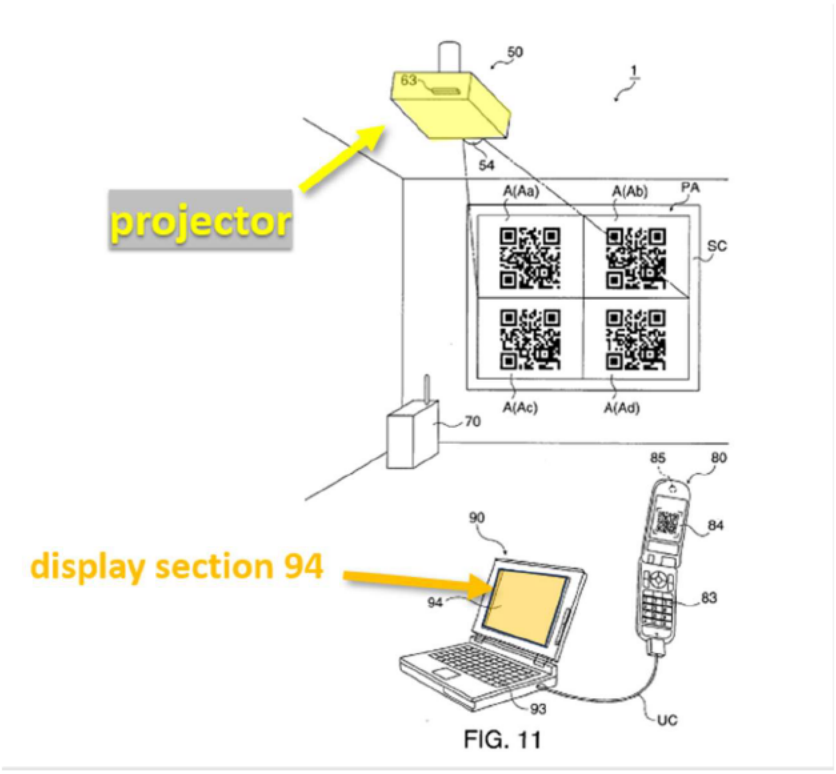


FIG. 11

Id., FIG. 11.

I. U.S. Patent Application Publication No. 2006/0069840 ("Corbett")

95. Corbett discloses a peripheral device, such as a USB flash drive 100, that connects to a host computing system 102 and includes a transmitter 122 for wireless transmission of data to an external device 150. Corbett, ¶17-20. The user may initiate the transmission of the data to the external device 150 by activating a transmission initiation selector button 134. *Id.*, ¶23.

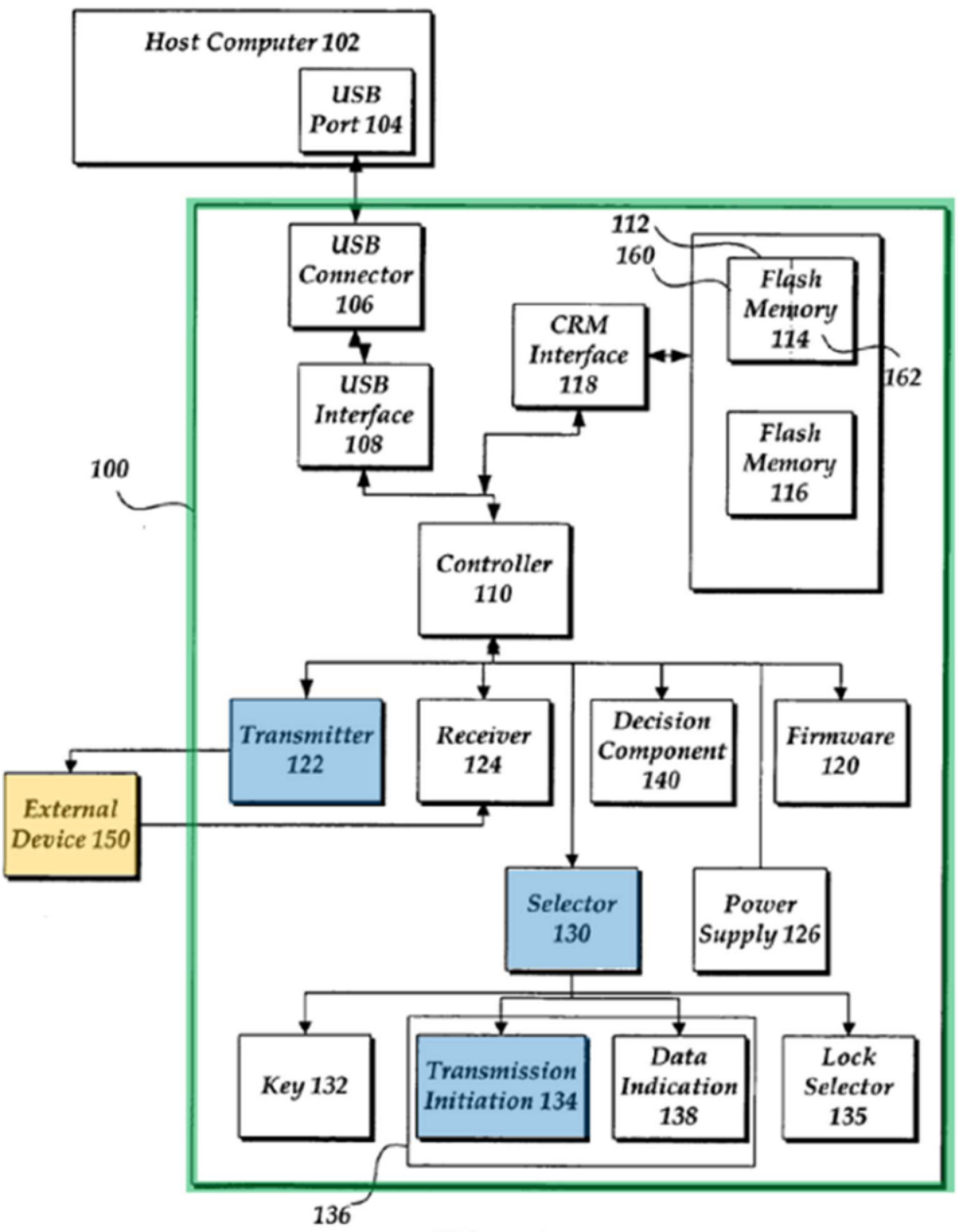


Fig. 1

Ex-1007, FIG. 1.

J. U.S. Patent Application Publication No. 2009/0172219 ("Mardiks")

96. Like the '237 patent, Mardiks discloses a USB peripheral device that can automatically launch an application residing in its memory after it is connected to a host. Mardiks, abstract. As discussed by Mardiks, the Universal Serial Bus (USB) standard allows interfacing

between the host and the peripheral device through a provided communications protocol, where the peripheral devices may be keyboards, compact disc (CD) players, USB flash drives, or other similar devices. *Id*., ¶1. Mardiks recognized that the USB standard did not provide for automatic launching of programs in its standard protocol; therefore, Mardiks sought and disclosed a method to "configure a USB flash drive so that, upon connection to a host supporting the USB standard … the USB flash drive would automatically launch an application residing in its memory." *Id*., ¶¶4-5. The advantage in such a system was that the user would not have to manually input additional commands to execute and launch the application. *Id*., ¶4.

97. Mardiks, therefore, uses a USB peripheral device 10 that included a USB interface 14, a controller 16, and a non-volatile memory 18 therein. *Id*., ¶19. An "application may reside on the non-volatile memory 18. Accordingly, the startup script may be written to cause the host 12 to execute the application." *Id*., ¶24. Alternatively, Mardiks disclosed that the startup script could be written to either cause the host to automatically execute an application on a network or that resided within the host itself. *Id*., ¶26.

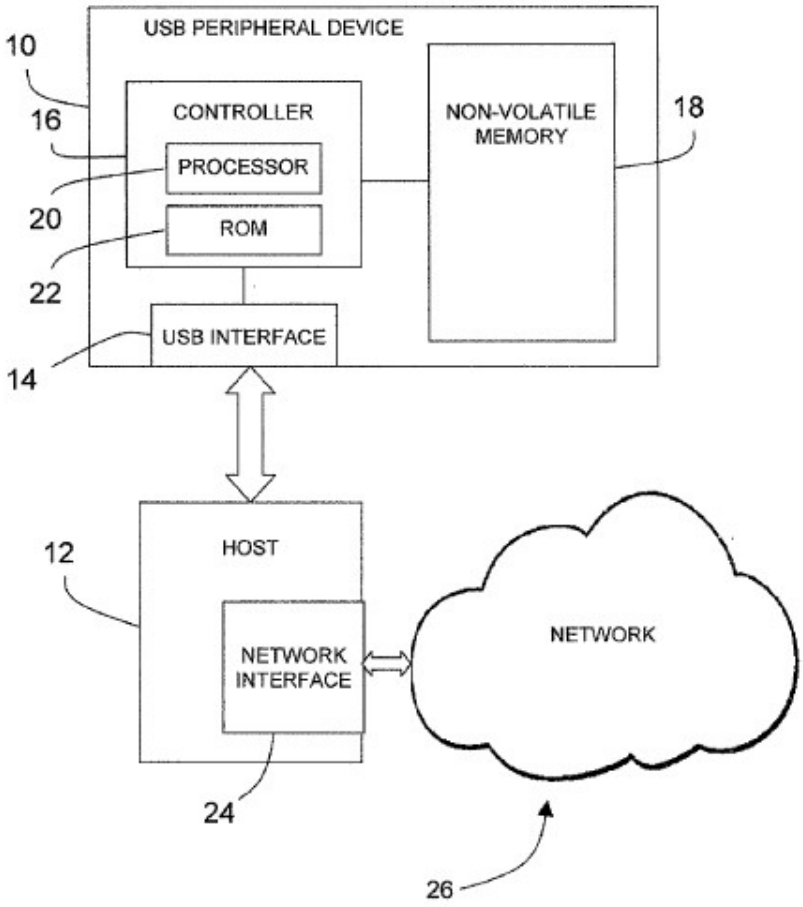


Fig. 1A

Id., FIG. 1A.

98. Mardiks demonstrates that it was common knowledge in the art regarding the ability to have an application automatically execute once it was connected to a host computing device, including whether the application was stored on the USB peripheral device itself, or on a network or the host computing device.

K. Utility and Advantages of the Patented Invention over Old Modes and Devices

99. Firstly, it is my that the Patent Trial and Appeal Board will cancel most of the claims of the asserted patents. The Board instituted four *inter partes* reviews, with Barco's

responses due on July 1, 2025. Therefore, the patented invention does not have any advantages over the old modes and devices.

100. Secondly, I reviewed the reasons for allowance for the asserted patents, discussed as follows.

101. The '002 patent was allowed for reciting "the peripheral device comprises an audio output device." YEALINK_00016875, pp. 601–06. However, at least Kaplan teaches this limitation: "video footage may be transmitted from the computer 220 through the transmitter 120." Kaplan, ¶28, FIG. 6; *see also id*., ¶¶8, 17 ("[D]ata may include video and audio data for display on the display device."), 22, 26, 47–52, 58.

102. The Patent Office did not provide any reasons for allowance for the '676 patent, but a related patent was allowed after claims were amended to include an input device, button or "actuator" on the peripheral device. *See* YEALINK_00016239 (notice of intent to issue reexamination certificate and response to final office action). However, at least Grimshaw discloses this actuator. Grimshaw. Grimshaw ¶¶5, 19 ("[T]he users of modules 14, 16, 18, 20 can take control of the display module 22 by respectively engaging buttons 344, 354, 364, 374, which causes switch controller 318 to pass the data signals from the selected user module on to the display module." (emphasis added)), 20, 27-28, FIGs. 1-4.

103. The Patent Office allowed the claims of the '237 patent after Barco amended the claims to require, "presenting the external peripheral device to the processing device as a human interface (HID) device." YEALINK_00015304. The combination of Kaplan and Mardiks, for example, teaches this limitation. Kaplan, ¶¶46-52, 58-60; Mardiks, ¶¶3-6; '237 patent, 25:7-23, 23:7-38.

104. The Patent Office provided no reasons to allow the claims of the '951 patent and allowed them after Barco addressed certain informalities. However, the PTAB has instituted review based on the standard that it is reasonably likely that the claims are unpatentable.

105. For the '103 patent, the Patent Office allowed the claim after Barco made several amendments, including requiring,

> wherein the base has a visual indicator which is also activated by the user action applied to the physical actuator, wherein the physical actuator is configured to be activated by the user action applied to the physical actuator to trigger delivery of the arbitrary media content on the host processing device to said transceiver on the computer peripheral device through said serial plug and play port and from the transceiver to the communications network.

YEALINK_00019500. Kaplan renders obvious this limitation: "video footage may be transmitted from the computer 220 through the transmitter 120." Kaplan, ¶28, FIG. 6; *see also id*., ¶¶8, 17 ("[D]ata may include video and audio data for display on the display device."), 22, 26, 47-52, 58.

106. The '832 patent was allowed for similar reasons as the '103 patent, *i.e.*, transmitting data displayed on a computer. YEALINK_00019508. Kaplan renders obvious this limitation for the same reason. Kaplan, ¶28, FIG. 6; *see also id*., ¶¶8, 17 ("[D]ata may include video and audio data for display on the display device."), 22, 26, 47-52, 58. Note that it is my opinion that the '103 and '832 patents are directed to the peripheral device or dongle itself, and not a system that includes the dongle, like the other four patents.

107. Based solely on the reasons for allowance, the patent invention is related to a particular way of sharing screen data using a peripheral device or dongle that, according to the Patent Office, is slightly different from prior art screen sharing solutions that also use dongles. It is therefore my opinion that the difference from the patented invention and the prior art is minimal, if there is even a patentable distinction, which I disagree with.

L. Nature of the Patented Invention

108. Each claim of the asserted patents requires both a "peripheral device" (*e.g.*, dongle) and a "base unit" (*e.g.*, receiver). Therefore, it is my opinion that the nature of the invention is a system that includes both of those components and is used to share screens. The nature of the invention is narrow because, as I discussed above, there are prior art systems that use peripheral devices to transmit screen data to a larger screen. Therefore, the nature of the patent invention is small compared to the prior art.

109. I agree Dr. Brogioli that any infringement analysis must identify both a peripheral device (*e.g.*, Yealink's WPP20 or WPP30) working with a base unit (*e.g.*, Yealink's MeetingBar or MeetingBoard). Infringement can only occur when the peripheral device is used, and it is only used with a base unit. It is therefore my opinion that the base units alone do not infringe any of the Asserted Patents, as I discuss further above in my discussion of the lack of direct infringement of the base unit alone.

XIII. FROST & SULLIVAN REPORT

110. I have reviewed the Frost & Sullivan's State of The Global Video Conferencing Device Market Forecast to 2025, dated March 2021, Mr. Scally's report and Mr. Scally's discussion of it. Mr. Scally wrote,

111. Frost & Sullivan identifies several companies that sell products meeting these "key benefits": Cisco, Logitech, Poly, Huawei, Kedacom, Avaya, Aver, Crestron, DTEN, Google, Huddly, Jabra, Neat, and Yealink.[48] Providers, such as Google, include only software for screen sharing or base unit hardware, such as a Google Chromecast or similar device. Frost & Sullivan does not identify Barco as providing these "key benefits."

112. Frost & Sullivan state, "Simplicity and ease of use wins—as meetings become more distributed, ad-hoc, frequent, and shorter, users want out-of-box, plug-and-play devices and easy click-to-join meetings."[49] It is my opinion that "click-to-join" meetings are not limited to using a USB dongle but include the more commonly used links that users "click-to-join." For example, Microsoft explains that users can use the Teams software to "share a link to the meeting that others can click to join."[50]

113. [redacted]

[redacted].[51]

XIV. NON-INFRINGING ALTERNATIVES

A. Dr. Brogioli Overlooks the Realities of the Market's Use of Unified Communications

114. There are several substitutes screen sharing technologies that are simple, secure, and agnostic. It is my experience that engineers and developers have a goal to design technologies specifically to be simple for users to use otherwise they would not be adopted. This is known as

[48] YEALINK_00014249–YEALINK_00014319, at YEALINK_00014308.
[49] YEALINK_00014249–YEALINK_00014319, at YEALINK_00014269.
[50] https://support microsoft.com/en-us/office/start-an-instant-meeting-in-microsoft-teams-ff95e53f-8231-4739-87fa-00b9723f4ef5.
[51] [redacted] Dep., 100:25–101:20.

making a technology as "frictionless" as possible so the technology is easy to use without needing any special education or training.

115. Dr. Brogioli first asserts that "wired connection[s are] not acceptable non-infringing alternatives."[52] However, it is my opinion from personal experience, and undisputed by Dr. Brogioli, that AirPlay, Miracast, SmartShare, and platforms such as Microsoft Teams, Zoom, Cisco WebEx, and Google Meet provide the capability for a user to connect a personal, or peripheral device and wirelessly share contents from that device without any wired connection. For example, it is my personal experience that Microsoft Teams or Zoom allow a user to connect to the meeting and, with the simple click of a button on the screen, share the user's screen to the meeting. [redacted] confirmed the ability to wirelessly share content through Zoom:[53]

[redacted]

116. Mr. Cai's testimony additionally confirms my opinion:[54]

> Q: Can Yealink's host machine of Yealink's videoconference system receive audio or video information from a non-Yealink transmitter?

[52] Brogioli Report, ¶84.
[53] [redacted] Dep., 46:13-25.
[54] Cai Dep., 48:3-24.

A: Our Teams or Zoom conferencing system can receive casting data sent over by Teams or Zoom apps.

Q: Wirelessly, wired, or both?

A: Both.

Q: And so if there was a Teams or Zoom conferencing system in this room, could I send data from my laptop to that system?

A: Yes.

Q: Without any sort of physical plug-in device?

A: Yes.

Q: How?

A: Via Teams' or Zoom's software.

117. Thus, it is my understanding that through the use of these protocols and platforms, a user can wirelessly share content from their personal processing device to a unified communication call without a peripheral device, *i.e.* dongle, couple or connected to the processing device.

118. Security is also a common in computer technologies. Common strategies for implementing secure communication include Secure Socket Later (SSL) encryption (and later Transport Layer Security (TLS)), various versions of Wi-Fi Protected Access (WPA), media access control (MAC) address filtering, hidden network Service Set IDentifiers (SSIDs), VPNs, and firewalls. Barco's witness, Wesley Lightcap, testified that security is "baked into the ClickShare product," but otherwise could not identify any particular security feature that was not already in the prior art or claimed by the patents.[55]

[55] Lightcap Dep., 29:2–30:2.

119. Dr. Brogioli also faults the protocols and platforms identified above as lacking the security benefit claimed in the Asserted Patents and Barco's ClickShare Button dongle. For example, Dr. Brogioli asserts the "protocols require the sharing device…to connect to or share a wireless network with the displaying device," and the "platforms require the sharing device…to communicate over an internet connection."[56] Apart from the security benefits already incorporated into network and internet connections, as discussed above, I find Dr. Brogioli's concern with security baseless in the realities of the market.

120. Mr. Six's testimony confirms my opinion that the purported security benefits of the Asserted Patents, and ClickShare Button, are only for wireless presentation within the individual meeting room. However, when using one of the protocols or platforms I list above, any alleged security benefit is negligible. For example, "I have a call, a Zoom call. I come in the meeting room. I can open my Zoom call in my laptop. The Zoom call opens, and then I can transform the meeting room [with the ClickShare Button] in order that microphones, speakers, the cameras are used off that meeting room and not off the laptop in a very simple, secure diagnostic [sic] way."[57] In this scenario, the wireless conference, and thus, wireless sharing of audio/visual material to other remote users, must use a network or internet connection. Using a network or internet connection to join and share data in the wireless conference negates any security benefit purportedly provided by the Asserted Patents and the ClickShare Button.

121. Thus, it is my opinion that the security claimed by the Asserted Patents, and which Dr. Brogioli uses to refute the non-infringing alternatives, has zero value in the wireless conferencing market. The security benefit's minimal value resides entirely with wireless

[56] Brogioli Report, ¶¶85-86.
[57] Six Dep., 48:22-49:5.

presentation within an individual meeting room which, as discussed above, is provided by the protocols and platforms above without the claimed dongle.

122. Finally, technologies are frequently platform-agnostic, which means that the technology can work on different devices (*e.g.*, laptops, tablets, and smartphones) and operating systems (*e.g.*, Windows, MacOS, iOS, and Android). An agnostic technology will have wider adoption because it functions on more devices. Therefore, most screen sharing technologies are platform agnostic to ensure wider adoption and compatibility.

B. Companies have designed non-infringing alternatives by removing the dongle's wireless transmitter

123. My review of the Asserted Claims reveals that each asserted independent claim requires a wireless transmitter in the dongle.

The '002 patent recites,

> Claim 1 and 11
>
> the peripheral device comprises a wireless transceiver
>
> Claim 21
>
> a transceiver of the peripheral device.

The '832 patent recites,

> Claim 1
>
> A computer peripheral device comprising: … a wireless transceiver and a processing engine, wherein said wireless transceiver and the processing engine are configured to connect the peripheral device directly to a wireless communications network.

The '103 patent recites,

> Claim 1

> A computer peripheral device comprising: ... a transceiver for communicating with a communications network.

The ’676 patent recites,

> Claim 1
>
> the peripheral device having a wireless transceiver;
>
> Claim 14
>
> transmitting the media content from the peripheral device to the communications network;
>
> Claim 16
>
> at least one peripheral device adapted to communicate the user selected arbitrary media content from the processing device to the base unit via the wireless communications network; … an input device to allow the user to carry out a user action that triggers transfer of said user selected arbitrary media content from said processing device to a transmitter and to the wireless communications network, the input device being an actuator coupled to the peripheral device.

The ’237 patent recites,

> Claims 1 and 9
>
> the external peripheral device having a transceiver
>
> Claim 18
>
> a transceiver of the external peripheral device;
>
> Claim 19
>
> the peripheral device comprises a wireless transceiver.

The ’951 patent recites,

Claims 1 and 21

> wherein the at least one peripheral device is a connection unit comprising … a transmitter for transferring said user selected arbitrary media content to the wireless communications network; and

Claim 16

> triggering transfer of said user selected arbitrary media content from said transmitter on the peripheral device.

124. Thus, a non-infringing alternative is to not use a transmitter in the dongle, but instead use the transmitter that is already integrated into nearly all computers and smart devices.

125. [redacted].[58]

126. [redacted][59]

127. It is also my understanding that Boxlight Corporation acquired Sahara Presentation Systems in or around September 5, 2020.[60] Using WayBack Machine, it was also revealed that the non-infringing Clevershare dongle was available at least as early as August 5, 2020.[61] The

[58] BARCO_0066567, 66576, 66579, 66590, and Dismissal - DDE-1-19-cv-01071-35.pdf.
[59] BARCO_0066576.
[60] YEALINK_00014616.
[61] YEALINK_00014550-551.

[redacted][62][redacted][63][redacted][64].

C. Companies, including Barco and Crestron, have designed non-infringing alternatives using a downloadable application instead of a dongle.

128. My review of the Asserted Claims further reveals the requirement for a "peripheral device." For the same reasons as discussed above in § XIV.B., an alternative solution that wirelessly shares audio/visual data to the "base unit" without requiring the peripheral device, *i.e.* dongle, would not infringe the Asserted Patents.

129. [redacted][65][redacted][66]

130. It is my understanding that a number of companies offered solutions to wirelessly stream audio/visual data to a "base unit" through the use of downloadable applications to the user's personal processing device. For example, and apart from the protocols and platforms I discussed above, I also understand that at least Barco and Boxlight (f/k/a Sahara Presentation Systems) each had applications readily downloadable to a user's personal processing device, and which were a substitute for the physical dongle, by the time of the hypothetical negotiation date. For example, Mr. Six testified:[67]

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[62] YEALINK_00014550-551.
[63] YEALINK_00014552 at 555.
[64] *See* YEALINK_00014619, YEALINK_00014582 at 588.
[65] [redacted] Dep., 100:25–101:20.
[66] *Id*.
[67] Six Dep., 43:5-12.

Q: By the second half of 2020, do you recall if the app-based ClickShare had been made available to the public?

A: Yes. It was definitely launched before the ClickShare conference.

Q: Okay. So it would have been before January of 2020?

Q: Yes.

131. Additionally, the Boxlight (f/k/a Sahara Presentation Systems) Clevershare application was available at least as early as August 5, 2020, and the user could "download the Clevershare app connect instantly."[68] The Clevershare application "allow[ed] you to cast multiple devices wirelessly to your interactive display. This includes Laptop, Mac, Chromebook, mobile phone and tablet."[69]

132. My review of the Asserted Claims further reveals the requirement for a "peripheral device." For the same reasons as discussed above in Section XIV.B., an alternative solution that wirelessly shares audio/visual data to the "base unit" without requiring the peripheral device, *i.e.* dongle, would not infringe the Asserted Patents.

[redacted].[70] [redacted].[71]

134. It is my understanding that a number of companies offered solutions to wirelessly stream audio/visual data to a "base unit" through the use of downloadable applications to the user's personal processing device. For example, and apart from the protocols and platforms I discussed

[68] YEALINK_00014550-551.
[69] YEALINK_00014613 at 614.
[70] [redacted] Dep., 100:25–101:20.
[71] *Id.*

above, I also understand that at least Barco and Boxlight (f/k/a Sahara Presentation Systems) each had applications readily downloadable to a user's personal processing device, and which were a substitute for the physical dongle, by the time of the hypothetical negotiation date. For example, Mr. Six testified:[72]

> Q: By the second half of 2020, do you recall if the app-based ClickShare had been made available to the public?
>
> A: Yes. It was definitely launched before the ClickShare conference.
>
> Q: Okay. So it would have been before January of 2020?
>
> Q: Yes.

135. Additionally, the Boxlight (f/k/a Sahara Presentation Systems) Clevershare application was available at least as early as August 5, 2020, and the user could "download the Clevershare app connect instantly."[73] The Clevershare application "allow[ed] you to cast multiple devices wirelessly to your interactive display. This includes Laptop, Mac, Chromebook, mobile phone and tablet."[74]

136. Mr. Scally's report included a graphic titled "ClickShare Advertising Graphic."[75] Neither Mr. Scally nor Dr. Brogioli testified how this data was collected, the number of samples taken, where the samples were taken, or whether users who do not have the "ClickShare application" installed use a ClickShare button to share their screens. It is therefore my opinion that the graphic is unreliable because the data collection methodology and raw data are unavailable.

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[72] Six Dep., 43:5-12.
[73] YEALINK_00014550-551.
[74] YEALINK_00014613 at 614.
[75] Scally Rpt., ¶102.

137. Nonetheless, non-infringing alternatives were well known. Transmitters in laptops could have been used instead of transmitters in dongles, as was done with the Sahara product. Scally Rpt., ¶72. Skype was also available as an alternative since at least 2003. https://web.archive.org/web/20151128100316/http://www.skype.com/en/ ("Skype Webpage (Archived Nov. 28, 2015)"). Indeed, Mr. Scally's report admits that there are alternatives, such as using an application. Scally Rpt., ¶102. Therefore, there were existing, acceptable and commercially viable alternatives to using a dongle to enable screen sharing at the time of the hypothetical negotiation.

XV. CONCLUSION

138. I reserve the right to amend or supplement my opinion herein as this case proceeds or as any additional information is discovered.

I declare under penalty of perjury that the foregoing is true and correct.

Executed this day of May 15, 2024
in Santa Barbara, CA.

Kevin C. Almeroth

Kevin C. Almeroth, Ph.D.

XVI. APPENDIX A

Kevin C. Almeroth

Professor Emeritus
Department of Computer Science
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Education

Ph.D.	June 1997	*Georgia Institute of Technology*	Computer Science
		Dissertation Title: Networking and System Support for the Efficient, Scalable Delivery of Services in Interactive Multimedia Systems	
		Minor: Telecommunications Public Policy	
M.S.	June 1994	*Georgia Institute of Technology*	Computer Science
		Specialization: Networking and Systems	
B.S.	June 1992	*Georgia Institute of Technology*	Information and Computer Science
(high honors)		*Minors*: Economics, Technical Communication, American Literature	

Employment History

Professor Emeritus	Department of Computer Science University of California Santa Barbara, CA	Nov 2020 -- present
Professor	Department of Computer Science University of California Santa Barbara, CA	Jul 2005 -- Oct 2020
Associate Dean	College of Engineering University of California Santa Barbara, CA	Mar 2007 -- Aug 2009
Vice Chair	Department of Computer Science University of California Santa Barbara, CA	Jul 2000 -- Nov 2005

Associate Professor	Department of Computer Science University of California Santa Barbara, CA	Jul 2001 -- Jun 2005
Assistant Professor	Department of Computer Science University of California Santa Barbara, CA	Jul 1997 -- Jun 2001
Graduate Researcher	Broadband Telecommunications Center Georgia Center for Adv Telecom Tech Atlanta, GA	Sep 1996--Jun 1997
Graduate Intern	IBM T.J. Watson Research Labs Hawthorne, NY	Jun 1995--Sep 1995
Support Specialist	Office of Information Technology Georgia Institute of Technology Atlanta, GA	Sep 1995--Jun 1997
Research Assistant	College of Computing Georgia Institute of Technology Atlanta, GA	Jan 1994--Mar 1994
Graduate Intern	Hitachi Telecommunications Norcross, GA	Jun 1992--Sep 1992
Undergraduate Intern	IBM Research Triangle Park, NC	Jun 1989--Sep 1989 Jun 1990--Sep 1990 Mar 1991--Sep 1991

Industry Technical Advising

Board of Directors	The New Media Studio Santa Barbara, CA	Nov 2006 -- present
Co-Founder & Chairman of the Board	Santa Barbara Labs, LLC Santa Barbara, CA	Sep 2007 -- Dec 2009
Board of Advisors	Techknowledge Point Santa Barbara, CA	May 2001 -- Dec 2007
Technical Advisory Board	Occam Networks, Inc. Santa Barbara, CA	May 2000 -- Dec 2010
Board of Advisors	Airplay Inc. San Francisco, CA	Jun 2005 -- Aug 2009
Consultant	Lockheed Martin Corporation San Jose, CA	Nov 1999 -- Jun 2009

Board of Advisors	Santa Barbara Technology Group Santa Barbara, CA	Sep 2000 -- Dec 2004
Board of Directors	Virtual Bandwidth, Inc. Santa Barbara, CA	Nov 2000 -- Jun 2001
Board of Advisors & Affiliated Scientist	Digital Fountain San Francisco, CA	Jan 2000 -- Dec 2001
Senior Technologist	IP Multicast Initiative, Stardust Forums Campbell, CA	Jun 1998 -- Dec 2000

I. Teaching

A. Courses Taught

CS 176A	Intro to Computer Communication Networks	Fall 1997, Fall 1998, Fall 2002, Fall 2003, Fall 2004, Spring 2005, Spring 2006, Spring 2007, Spring 2008, Fall 2008, Fall 2009, Fall 2010, Fall 2011, Fall 2012, Fall 2013, Fall 2014, Spring 2017, Spring 2018, Spring 2020, Fall 2020
CS 176B	Network Computing	Winter 2000, Winter 2001, Winter 2002, Winter 2012, Winter 2014, Winter 2015, Winter 2018, Winter 2019, Winter 2020
MAT 201B	Media Networks and Services	Fall 1999, Fall 2000, Fall 2001, Fall 2003
CS 276	Distributed Computing and Computer Networks	Winter 1999, Spring 2000, Fall 2002, Fall 2005, Fall 2018
CS 290I	Networking for Multimedia Systems	Winter 1998, Spring 1999, Fall 2004, Winter 2010
CS 595N	Technology and Society	Winter 2005, Fall 2005, Spring 2006, Fall 2006, Spring 2007, Fall 2007, Spring 2008, Fall 2008, Spring 2009
CS 595N	Economic Systems Seminar	Winter 2004, Spring 2004, Winter 2005, Spring 2005
CS 595N	Networking Seminar	Winter 1999, Fall 1999, Winter 2003, Winter 2019
CS 595N	Wireless Networking & Multimedia Seminar	Fall 2000
CS 595I	Systems Design and Implementation Seminar	Fall 1999, Fall 2000, Winter 2001, Spring 2001, Winter 2002, Spring 2002

B. Other Teaching Experience

- *The Evolution of Advanced Networking Services: From the ARPAnet to Internet2*, Instructor, Summer 2001. Short course taught at Escuela de Ciencias Informatica (ECI) sponsored by the Universidad de Buenos Aires.

- *Johns Hopkins Center for Talented Youth*, Instructor, Summer 1994. CTY is a program to teach gifted high school students the fundamentals of computer science.

- *Georgia Institute of Technology*, Graduate Teaching Assistant, Sep 1994--Sep 1996. Worked as a TA for 12 quarters teaching 7 different courses (4 undergraduate and 3 graduate).

C. Ph.D. Students Advised [14 graduated]

14. Daniel Havey
    Research Area: *Throughput and Delay on the Packet Switched Internet*
    Date Graduated: Winter 2015
    First Position: Microsoft
13. Lara Deek (co-advised with E. Belding)
    Research Area: *Resource-Efficient Wireless Systems for Emerging Wireless Networks*
    Date Graduated: Summer 2014
    First Position: Post Doc, UIUC
12. Mike Wittie
    Research Area: *Towards Sustained Scalability of Communication Networks*
    Date Graduated: Summer 2011
    First Position: Assistant Professor, Montana State University
11. Allan Knight
    Research Area: *Supporting Integration of Educational Technologies and Research of Their Effects on Learning*
    Date Graduated: Summer 2009
    First Position: Research Scientist, Citrix Online
10. Hangjin Zhang
    Research Area: *Towards Blended Learning: Educational Technology to Improve and Assess Teaching and Learning*
    Date Graduated: Spring 2009
    First Position: Microsoft
9. Gayatri Swamynathan
    Dissertation Title: *Towards Reliable Reputations for Distributed Applications*
    Date Graduated: Spring 2008
    First Position: Zynga
8. Amit Jardosh (co-advised with E. Belding)
    Dissertation Title: *Adaptive Large-Scale Wireles Networks: Measurements, Protocol Designs, and Simulation Studies*
    Date Graduated: Fall 2007
    First Position: Yahoo!
7. Khaled Harras
    Dissertation Title: *Protocol and Architectural Challenges in Delay and Disruption Tolerant Networks*
    Date Graduated: Summer 2007
    First Position: Assistant Professor, Carnegie Mellon University
6. Krishna Ramachandran (co-advised with E. Belding)
    Dissertation Title: *Design, Deployment, and Management of High-Capacity Wireless Mesh Networks*
    Date Graduated: Winter 2006
    First Position: Research Scientist, Citrix Online

5. Robert Chalmers
   Dissertation Title: *Improving Device Mobility with Intelligence at the Network Edge*
   Date Graduated: Summer 2004
   First Position: President and CEO, Limbo.net
4. Prashant Rajvaidya
   Dissertation Title: *Achieving Robust and Secure Deployment of Multicast*
   Date Graduated: Spring 2004
   First Position: President and CTO, Mosaic Networking
3. Sami Rollins
   Dissertation Title: *Overcoming Resource Constraints to Enable Content Exchange Applications in Next-Generation Environments*
   Date Graduated: Spring 2003
   First Position: Assistant Professor, Mount Holyoke College
2. Srinivasan Jagannathan
   Dissertation Title: *Multicast Tree-Based Congestion Control and Topology Management*
   Date Graduated: Spring 2003
   First Position: Consultant, Kelly & Associates
1. Kamil Sarac
   Dissertation Title: *Supporting a Robust Multicast Service in the Global Infrastructure*
   Date Graduated: Spring 2002
   First Position: Assistant Professor, UT-Dallas

D. M.S. Students Advised (Thesis/Project Option) [19 graduated]

19. Neer Shey
   Research Area: *Analyzing Content Distribution Through Opportunistic Contact for Smart Cellular Phones*
   Date Graduated: Spring 2010
18. Camilla Fiorese
   Research Area: *Analysis of a Pure Rate-Based Congestion Control Algorithm*
   Date Graduated: Summer 2009
17. Brian Weiner
   Research Area: *Multi-Socket TCP: A Simple Approach to Improve Performance of Real-Time Applications over TCP*
   Date Graduated: Fall 2007
16. Avijit Sen Mazumder
   Research Area: *Facilitating Robust Multicast Group Management*
   Date Graduated: Fall 2005
15. Rishi Matthew
   Thesis Title: *Providing Seamless Access to Multimedia Content on Heterogeneous Platforms*
   Date Graduated: Summer 2004
14. Camden Ho
   Research Area: *Tools and Techniques for Wireless Network Management*
   Date Graduated: Spring 2004
13. Amit Jardosh (co-advised with E. Belding)
   Research Area: *Realistic Environment Models for Mobile Network Evaluation*
   Date Graduated: Spring 2004
12. Nitin Solanki
   Research Area: *SongWand: A Wireless Barcode Scanner Using Bluetooth Technology*

Date Graduated: Winter 2004

11. Vrishali Wagle (co-advised with E. Belding)
    Research Area: *An Ontology-Based Service Discovery Mechanism*
    Date Graduated: Winter 2004
10. Uday Mohan
    Thesis Title: *Scalable Service Discovery in Mobile Ad hoc Networks*
    Date Graduated: Spring 2003
9. Krishna Ramachandran
    Thesis Title: *Ubiquitous Multicast*
    Date Graduated: Spring 2003
8. John Slonaker
    Thesis Title: *Inductive Loop Signature Acquisition Techniques*
    Date Graduated: Spring 2002
7. Mohammad Battah
    Thesis Title: *Dedicated Short-Range Communications Intelligent Transportation Systems Protocol (DSRC-ITS)*
    Date Graduated: Spring 2002
6. Kevin Vogel
    Thesis Title: *Integrating E-Commerce Applications into Existing Business Infrastructures*
    Date Graduated: Spring 2001
5. Sami Rollins
    Thesis Title: *Audio XmL: Aural Interaction with XML Documents*
    Date Graduated: Winter 2000
4. Andy Davis
    Thesis Title: *Stream Scheduling for Data Servers in a Scalable Interactive TV System*
    Date Graduated: Spring 1999
3. David Makofske
    Thesis Title: *MHealth: A Real-Time Graphical Multicast Monitoring Tool*
    Date Graduated: Winter 1999
2. Prashant Rajvaidya
    Thesis Title: *MANTRA: Router-Based Monitoring and Analysis of Multicast Traffic*
    Date Graduated: Winter 1999
1. Alex DeCastro (co-advised with Yuan-Fang Wang)
    Thesis Title: *Web-Based Collaborative 3D Modeling*
    Date Graduated: Winter 1998

E. Teaching Awards

2006-2007 UCSB Academic Senate Distinguished Teaching Award
2004-2005 Computer Science Outstanding Faculty Member
2000-2001 UCSB Spotlight on Excellence Award
1999-2000 Computer Science Outstanding Faculty Member (co-recipient)
1998-1999 Computer Science Outstanding Faculty Member (co-recipient)
1997-1998 Computer Science Outstanding Faculty Member

II. Research

A. Journal Papers, Magazine Articles, Books, and Book Chapters

62. L. Deek, E. Garcia-Villegas, E. Belding, S.J. Lee, and K. Almeroth, "A Practical Framework for 802.11 MIMO Rate Adaptation," Computer Networks, vol. 83, num. 6, pp. 332-348, June 2015.

61. L. Deek, E. Garcia-Villegas, E. Belding, S.J. Lee, and K. Almeroth, "Intelligent Channel Bonding in 802.11n WLANs," IEEE Transactions on Mobile Computing, vol. 13, num. 6, pp. 1242-1255, June 2014.

60. H. Zhang and K. Almeroth, "Alternatives for Monitoring and Limiting Network Access to Students in Network-Connected Classrooms," Journal of Interactive Learning Research (JILR), vol. 24, num. 3, pp. 237-265, July 2013.

59. M. Tavakolifard and K. Almeroth, "A Taxonomy to Express Open Challenges in Trust and Reputation Systems," Journal of Communications, vol. 7, num. 7, pp. 538-551, July 2012.

58. M. Tavakolifard and K. Almeroth, "Social Computing: An Intersection of Recommender Systems, Trust/Reputation Systems, and Social Networks," IEEE Network, vol. 26, num. 4, pp. 53-58, July/ August 2012.

57. M. Tavakolifard, K. Almeroth, and P. Ozturk, "Subjectivity Handling of Ratings for Trust and Reputation Systems: An Abductive Reasoning Approach," International Journal of Digital Content Technology and its Applications (JDCTA), vol. 5, num. 11, pp. 359-377, November 2011.

56. R. Raghavendra, P. Acharya, E. Belding and K. Almeroth, "MeshMon: A Multi-Tiered Framework for Wireless Mesh Network Monitoring," Wireless Communications and Mobile Computing (WCMC) Journal, vol. 11, num. 8, pp. 1182-1196, August 2011.

55. A. Knight and K. Almeroth, "Automatic Plagiarism Detection with PAIRwise 2.0," Journal of Interactive Learning Research (JILR), vol. 22, num. 3, pp. 379-400, July 2011.

54. V. Kone, M. Zheleva, M. Wittie, B. Zhao, E. Belding, H. Zheng, and K. Almeroth, "AirLab: Consistency, Fidelity and Privacy in Wireless Measurements," ACM Computer Communications Review, vol. 41, num. 1, pp. 60-65, January 2011.

53. G. Swamynathan, K. Almeroth, and B. Zhao, "The Design of a Reliable Reputation System," Electronic Commerce Research Journal, vol. 10, num. 3-4, pp. 239-270, December 2010.

52. P. Acharya, A. Sharma, E. Belding, K. Almeroth and K. Papagiannaki, "Rate Adaptation in Congested Wireless Networks through Real-Time Measurements," IEEE Transactions on Mobile Computing, vol. 9, num. 11, pp. 1535-1550, November 2010.

51. R. Raghavendra, E. Belding, K. Papagiannaki, and K. Almeroth, "Unwanted Link Layer Traffic in Large IEEE 802.11 Wireless Networks," IEEE Transactions on Mobile Computing, vol. 9, num. 9, pp. 1212-1225, September 2010.

50. H. Zhang and K. Almeroth, "Moodog: Tracking Student Activity in Online Course Management Systems," Journal of Interactive Learning Research (JILR), vol. 21, num. 3, pp. 407-429, July 2010.

49. R. Chertov and K. Almeroth, "Qualitative Comparison of Link Shaping Techniques," International

Journal of Communication Networks and Distributed Systems, vol. 5, num. 1/2, pp. 109-129, July 2010.

48. A. Knight and K. Almeroth, "Fast Caption Alignment for Automatic Indexing of Audio," International Journal of Multimedia Data Engineering and Management, vol. 1, num. 2, pp. 1-17, April-June 2010.

47. K. Harras and K. Almeroth, "Scheduling Messengers in Disconnected Clustered Mobile Networks," Ad Hoc & Sensor Wireless Networks, vol. 9, num. 3-4, pp. 275-304, March-April 2010.

46. A. Jardosh, K. Papagiannaki, E. Belding, K. Almeroth, G. Iannaccone, and B. Vinnakota, "Green WLANs: On-Demand WLAN Infrastructures," ACM Journal on Mobile Networks and Applications (MONET), vol. 14, num. 6, pp. 798-814, December 2009.

45. M. Wittie, K. Harras, K. Almeroth, and E. Belding, "On the Implications of Routing Metric Staleness in Delay Tolerant Networks," Computer Communications Special Issue on Delay and Disruption Tolerant Networking, vol. 32, num. 16, pp. 1699-1709, October 2009.

44. K. Harras, L. Deek, C. Holman, and K. Almeroth, "DBS-IC: An Adaptive Data Bundling System for Intermittent Connectivity," Computer Communications Special Issue on Delay and Disruption Tolerant Networking, vol. 32, num. 16, pp. 1687-1698, October 2009.

43. S. Karpinski, E. Belding, K. Almeroth, and J. Gilbert, "Linear Representations of Network Traffic," ACM Journal on Mobile Networks and Applications (MONET), vol. 14, num. 4, pp. 368-386, August 2009.

42. K. Harras and K. Almeroth, "Controlled Flooding in Disconnected Sparse Mobile Networks," Wireless Communications and Mobile Computing (WCMC) Journal, vol. 9, num. 1, pp. 21-33, January 2009.

41. R. Mayer, A. Stull, K. DeLeeuw, K. Almeroth, B. Bimber, D. Chun, M. Bulger, J. Campbell, A. Knight, and H. Zhang, "Clickers in College Classrooms: Fostering Learning with Questioning Methods in Large Lecture Classes," Contemporary Educational Psychology, vol. 34, num. 1, pp. 51-57, January 2009.

40. A. Knight, K. Almeroth, and B. Bimber, "Design, Implementation and Deployment of PAIRwise," Journal of Interactive Learning Research (JILR), vol. 19, num. 3, pp. 489-508, July 2008.

39. A. Garyfalos and K. Almeroth, "Coupons: A Multilevel Incentive Scheme for Information Dissemination in Mobile Networks," IEEE Transactions on Mobile Computing, vol. 7, num. 6, pp. 792-804, June 2008.

38. I. Sheriff, K. Ramachandran, E. Belding, and K. Almeroth, "A Multi-Radio 802.11 Mesh Network Architecture," ACM Journal on Mobile Networks and Applications (MONET), vol. 13, num. 1-2, pp. 132-146, April 2008.

37. M. Bulger, R. Mayer, K. Almeroth, and S. Blau, "Measuring Learner Engagement in Computer-Equipped College Classrooms," Journal of Educational Multimedia and Hypermedia, vol. 17, num. 2, pp. 129-143, April 2008.

36. G. Swamynathan, B. Zhao, and K. Almeroth, "Exploring the Feasibility of Proactive Reputations," Concurrency and Computation: Practice and Experience, vol. 20, num. 2, pp. 155-166, February 2008.

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32. D. Johnson, E. Belding, K. Almeroth and G. van Stam, "Internet Usage and Performance Analysis of a Rural Wireless Network in Macha, Zambia," *ACM Networked Systems for Developing Regions (NSDR) Workshop*, San Francisco, California, USA, June 2010.

31. D. Havey, R. Chertov, and K. Almeroth, "Wired Wireless Broadcast Emulation," *International Workshop on Wireless Network Measurement (WiNMee)*, Seoul, Korea, June 2009.

30. R. Raghavendra, P. Acharya, E. Belding, and K. Almeroth, "MeshMon: A Multi-Tiered Framework for Wireless Mesh Network Monitoring," *ACM Mobihoc Wireless of the Students, by the Students, for the Students Workshop (S3)*, New Orleans, Louisiana, USA, May 2009.

29. G. Swamynathan, C. Wilson, B. Boe, B. Zhao, and K. Almeroth, "Do Social Networks Improve e-Commerce: A Study on Social Marketplaces," *ACM Sigcomm Workshop on Online Social Networks (WOSN)*, Seattle, Washington, USA, August 2008.

28. R. Raghavendra, E. Belding, and K. Almeroth, "Antler: A Multi-Tiered Approach to Automated Wireless Network Management," *IEEE Workshop on Automated Network Management (ANM)*, Phoenix, Arizona, USA, April 2008.

27. S. Karpinski, E. Belding, and K. Almeroth, "Towards Realistic Models of Wireless Workload," *International Workshop on Wireless Network Measurement (WiNMee)*, Limassol, CYPRUS, April 2007.

26. K. Harras, M. Wittie, K. Almeroth, and E. Belding, "ParaNets: A Parallel Network Architecture for Challenged Networks," *IEEE Workshop on Mobile Computing Systems and Applications (HotMobile)*, Tucson, Arizona, USA, February 2007.

25. H. Caituiro-Monge, K. Almeroth, M. del Mar Alvarez-Rohena, "Friend Relay: A Resource Sharing Framework for Mobile Wireless Devices," *ACM International Workshop on Wireless Mobile Applications and Services on WLAN Hotspots (WMASH)*, Los Angeles, California, September 2006.

24. G. Swamynathan, Ben Y. Zhao and K. Almeroth, "Exploring the Feasibility of Proactive Reputations," *International Workshop on Peer-to-Peer Systems (IPTPS)*, Santa Barbara, California, USA, February 2006.

23. G. Swamynathan, Ben Y. Zhao and K. Almeroth, "Decoupling Service and Feedback Trust in a Peer-to-Peer Reputation System," *International Workshop on Applications and Economics of Peer-to-Peer Systems (AEPP)*, Nanjing, CHINA, November 2005.

22. K. Ramachandran, M. Buddhikot, G. Chandranmenon, S. Miller, E. Belding, and K. Almeroth, "On the Design and Implementation of Infrastructure Mesh Networks," *IEEE Workshop on Wireless Mesh Networks (WiMesh)*, Santa Clara, California, USA, September 2005.

21. A. Jardosh, K. Ramachandran, K. Almeroth and E. Belding, "Understanding Link-Layer Behavior in Highly Congested IEEE 802.11b Wireless Networks," Sigcomm Workshop on Experimental Approaches to Wireless Network Design and Analysis (EWIND), Philadelphia, Pennsylvania, USA, August 2005.

20. A. Sen Mazumder, K. Almeroth and K. Sarac, "Facilitating Robust Multicast Group Management," *Network and Operating System Support for Digital Audio and Video (NOSSDAV)* , Skamania, Washington, USA, June 2005.

19. Y. Sun, I. Sheriff, E. Belding and K. Almeroth, "An Experimental Study of Multimedia Traffic Performance in Mesh Networks," MobiSys International Workshop on Wireless Traffic Measurements and Modeling (WitMeMo), Seattle, Washington, USA, June 2005.

18. K. Ramachandran, K. Almeroth and E. Belding, "A Framework for the Management of Large-Scale Wireless Network Testbeds," International Workshop on Wireless Network Measurement (WiNMee), Trentino, ITALY, April 2005.

17. A. Garyfalos, K. Almeroth and K. Sanzgiri, "Deployment Complexity Versus Performance Efficiency in Mobile Multicast," *International Workshop on Broadband Wireless Multimedia: Algorithms, Architectures and Applications (BroadWiM)*, San Jose, California, USA, October 2004.

16. C. Ho, K. Ramachandran, K. Almeroth and E. Belding, "A Scalable Framework for Wireless Network Monitoring," *ACM International Workshop on Wireless Mobile Applications and Services on WLAN Hotspots (WMASH)*, Philadelphia, Pennsylvania, USA, October 2004.

15. A. Garyfalos, K. Almeroth and J. Finney, "A Hybrid of Network and Application Layer Multicast for Mobile IPv6 Networks," *International Workshop on Large-Scale Group Communication (LSGC)*, Florence, ITALY, October 2003.

14. A. Garyfalos, K. Almeroth and J. Finney, "A Comparison of Network and Application Layer Multicast for Mobile IPv6 Networks," *ACM Workshop on Modeling, Analysis and Simulation of Wireless and Mobile Systems (MSWiM)*, San Diego, California, USA, September 2003.

13. S. Jagannathan, and K. Almeroth, "Pricing and Resource Provisioning for Delivering E-Content On-Demand with Multiple Levels-of-Service," *International Workshop on Internet Charging and QoS Technologies (ICQT)*, Zurich, SWITZERLAND, October 2002.

12. S. Rollins, K. Almeroth, D. Milojicic, and K. Nagaraja, "Power-Aware Data Management for Small Devices," *Workshop on Wireless Mobile Multimedia (WoWMoM)*, Atlanta, GA, USA, September 2002.

11. K. Almeroth, S. Bhattacharyya, and C. Diot, "Challenges of Integrating ASM and SSM IP Multicast Protocol Architectures," *International Workshop on Digital Communications: Evolutionary Trends of the Internet (IWDC)*, Taormina, ITALY, September 2001.

10. K. Sarac and K. Almeroth, "Scalable Techniques for Discovering Multicast Tree Topology," *Network and Operating System Support for Digital Audio and Video (NOSSDAV)* , Port Jefferson, New York, USA, June 2001.

9. P. Rajvaidya, K. Almeroth and K. Claffy, "A Scalable Architecture for Monitoring and Visualizing Multicast Statistics," *IFIP/IEEE International Workshop on Distributed Systems: Operations & Management (DSOM)*, Austin, Texas, USA, December 2000.

8. S. Jagannathan, K. Almeroth and A. Acharya, "Topology Sensitive Congestion Control for Real-Time Multicast," *Network and Operating System Support for Digital Audio and Video (NOSSDAV)* , Chapel Hill, North Carolina, USA, June 2000.

7. K. Sarac and K. Almeroth, "Supporting the Need for Inter-Domain Multicast Reachability," *Network and Operating System Support for Digital Audio and Video (NOSSDAV)* , Chapel Hill , North Carolina, USA, June 2000.

6. D. Makofske and K. Almeroth, "MHealth: A Real-Time Multicast Tree Visualization and Monitoring Tool," *Network and Operating System Support for Digital Audio and Video (NOSSDAV)* , Basking Ridge New Jersey, USA, June 1999.

5. K. Almeroth and Y. Zhang, "Using Satellite Links as Delivery Paths in the Multicast Backbone (MBone)," *ACM/IEEE International Workshop on Satellite-Based Information Services (WOSBIS)*, Dallas, Texas, USA, October 1998.

4. M. Ammar, K. Almeroth, R. Clark and Z. Fei, "Multicast Delivery of Web Pages OR How to Make Web Servers Pushy," *Workshop on Internet Server Performance (WISP)*, Madison, Wisconsin, USA, June 1998.

3. K. Almeroth and M. Ammar, "Prototyping the Interactive Multimedia Jukebox," *Mini-conference on Multimedia Appliances, Interfaces, and Trials--International Conference on Communications (ICC)*,

Montreal, Quebec, CANADA, June 1997.

2. K. Almeroth and M. Ammar, "Collection and Modeling of the Join/Leave Behavior of Multicast Group Members in the MBone," *High Performance Distributed Computing Focus Workshop (HPDC)*, Syracuse, New York, USA, August 1996.

1. K. Almeroth and M. Ammar, "The Role of Multicast Communication in the Provision of Scalable and Interactive Video-On-Demand Service," *Network and Operating System Support for Digital Audio and Video (NOSSDAV)* , Durham, New Hampshire, USA, April 1995.

D. Non-Refereed Publications

8. K. Almeroth, E. Belding, M. Buddhikot, G. Chandranmenon, S. Miller, and K. Ramachandran, "Infrastructure Mesh Networks," *U.S. Patent Application US20070070959 A1*, September 2005.

7. K. Almeroth, R. Caceres, A. Clark, R. Cole, N. Duffield, T. Friedman, K. Hedayat, K. Sarac, M. Westerlund, "RTP Control Protocol Extended Reports (RTCP XR)," *Internet Engineering Task Force (IETF) Request for Comments (RFC) 3611*, November 2003.

6. Z. Albanna, K. Almeroth, D. Meyer, and M. Schipper, "IANA Guidelines for IPv4 Multicast Address Allocation," *Internet Engineering Task Force (IETF) Request for Comments (RFC) 3171*, August 2001.

5. B. Quinn and K. Almeroth, "IP Multicast Applications: Challenges and Solutions," *Internet Engineering Task Force (IETF), Request for Comments (RFC) 3170*, September 2001.

4. K. Almeroth, L. Wei and D. Farinacci, "Multicast Reachability Monitor (MRM) Protocol," *Internet Engineering Task Force Internet Draft*, July 2000.

3. K. Almeroth and L. Wei, "Justification for and use of the Multicast Reachability Monitor (MRM) Protocol," *Internet Engineering Task Force Internet Draft*, March 1999.

2. K. Almeroth, "Managing IP Multicast Traffic: A First Look at the Issues, Tools, and Challenges," IP Multicast Initiative White Paper, San Jose, California, USA, February 1999.

1. K. Almeroth, K. Obraczka and D. De Lucia, "Pseudo-IP: Providing a Thin Network Protocol for Semi-Intelligent Wireless Devices," *DARPA/NIST Smart Spaces Workshop*, Gaithersburg, Maryland, USA, July 1998.

E. Released Software Systems

19. ***A Multi-radio Wireless Mesh Network Architecture -- http://moment.cs.ucsb.edu/tic/.*** Released December 1, 2006 (with K. Ramachandran, I. Sheriff, and E. Belding). The software as part of a multi-radio wireless mesh network that includes a Split Wireless Router that alleviates the interference that can occur between commodity radios within a single piece of hardware. The second is server software to perform channel assignment and communicate the assignments throughout the mesh network.

18. ***AODV-Spanning Tree (AODV-ST) -- http://www.cs.ucsb.edu/~krishna/aodv-st/.*** Released September 1, 2006 (with K. Ramachandran and E. Belding). AODV-ST is an extension of the well-known AODV

protocol specifically designed for wireless mesh networks. The advantages of AODV-ST over AODV include support for high throughput routing metrics, automatic route maintenance for common-case traffic, and low route discovery latency.

17. ***The Multicast Detective -- http://www.nmsl.cs.ucsb.edu/mcast_detective/.*** Released September 1, 2005 (with A. Sen Mazumder). The multicast detective is a robust solution to determine the existence and nature of multicast service for a particular user. By performing a series of tests, a user can determine whether there is network support for multicast, and consequently, whether a multicast group join is likely to succeed.

16. ***AutoCap: Automatic and Accurate Captioning -- http://www.nmsl.cs.ucsb.edu/autocap/.*** Released August 1, 2005 (with A. Knight). AutoCap is a software system that takes as input an audio/video file and a text transcript. AutoCap creates captions by aligning the utterances in the audio/video file to the transcript. For those words that are not recognized, AutoCap estimates when the words were spoken along with an error bound that gives the content creator an idea of caption accuracy. The result is a collection of accurately time-stamped captions that can be displayed with the video.

15. ***PAIRwise Plagiarism Detection System -- http://cits.ucsb.edu/pair/.*** Released July 1, 2005 (with A. Knight). PAIRwise is a plagiarism detection system with: (1) an easy-to-use interface for submitting papers, (2) a flexible comparison engine that allows intra-class, inter-class, and Internet-based comparisons, and (3) an intuitive graphical presentation of results.

14. ***DAMON Multi-Hop Wireless Network Monitoring -- http://moment.cs.ucsb.edu/damon/.*** Released October 1, 2004 (with K. Ramachandran and E. Belding). DAMON is a distributed system for monitoring multi-hop mobile networks. DAMON uses agents within the network to monitor network behavior and send collected measurements to data repositories. DAMON's generic architecture supports the monitoring of a wide range of protocol, device, or network parameters.

13. ***Multicast Firewall -- http://www.nmsl.cs.ucsb.edu/mafia/.*** Released June 1, 2004 (with K. Ramachandran). MAFIA, a multicast firewall and traffic management solution, has the specific aim of strengthening multicast security through multicast access control, multicast traffic filtering, and DoS attack prevention.

12. ***AODV@IETF Peer Routing Software-- http://moment.cs.ucsb.edu/aodv-ietf/.*** Released November 1, 2003 (with K. Ramachandran and E. Belding). One of the first large-scale efforts to run the Ad hoc On demand Distance Vector (AODV) routing protocol in a public space (at the Internet Engineering Task Force (IETF)). The implementation includes a daemon that runs on both the Linux and Windows operating systems.

11. ***Mobility Obstacles -- http://moment.cs.ucsb.edu/mobility/.*** Released September 1, 2003 (with A. Jardosh, E. Belding, and S. Suri). The topology and movement of nodes in ad hoc protocol simulation are key factors in protocol performance. In this project, we have developed ns-2 simulation plug-ins that create more realistic movement models through the incorporation of obstacles. These obstacles are utilized to restrict both node movement and wireless transmissions.

10. ***mwalk -- http://www.nmsl.cs.ucsb.edu/mwalk/.*** Released December 1, 2000 (with R. Chalmers). Mwalk is a collection of Java applications and Perl scripts which re-create a global view of a multicast session from mtrace and RTCP logs. Users to the site can download mwalk, examine the results of our analysis, or download data sets for use in simulations dependent on multicast tree characteristics.

9. ***MANTRA2 -- http://www.nmsl.cs.ucsb.edu/mantra/.*** Released December 1, 1999 (with P. Rajvaidya). This new version of MANTRA focuses on the visualization of inter-domain routing statistics. Working

in conjunction with the Cooperative Association for Internet Data Analysis (CAIDA) we have developed advanced collection and visualization techniques.

8. ***MRM -- http://www.nmsl.cs.ucsb.edu/mrm/.*** Released October 1, 1999 (with K. Sarac). MRM is the Multicast Reachability Protocol. We have implemented an end-host agent that responds to MRM Manager commands. Our end-host agent works in conjunction with Cisco routers to detect and isolate multicast faults.

7. ***MANTRA -- http://www.nmsl.cs.ucsb.edu/mantra/.*** Released January 1, 1999 (with P. Rajvaidya). MANTRA is the Monitoring and Analysis of Traffic in Multicast Routers. It uses scripts to collect and display data from backbone multicast routers.

6. ***SDR Monitor -- http://www.nmsl.cs.ucsb.edu/sdr-monitor/.*** Released January 1, 1999 (with K. Sarac). The SDR Monitor receives e-mail updates from participants containing information about observed sessions in the MBone. A global view of multicast reachability is then constructed.

5. ***The MHealth tool -- http://www.nmsl.cs.ucsb.edu/mhealth/.*** Released September 1, 1998 (with D. Makofske). The mhealth tool graphically visualizes MBone multicast group trees and provides `health' information including end-to-end losses per receiver and losses on a per hop basis. The implementation required expertise in Java, the MBone tools, and Unix.

4. ***The MControl tool -- http://www.nmsl.cs.ucsb.edu/mcontrol/.*** Released August 1, 1998 (with D. Makofske). Mcontrol is a tool to provide VCR-based interactivity for live MBone sessions. The implementation required expertise in Java, the MBone tools, and Unix.

3. ***Interactive Multimedia Jukebox (IMJ) -- http://imj.ucsb.edu/.*** Released October 1, 1996. The IMJ combines the WWW and the MBone conferencing tools to provide a multi-channel video jukebox offering both instructional and entertainment programming on a wide scale. The implementation required expertise in HTML, Perl, C, the MBone tools, and Unix.

2. ***Mlisten -- http://www.cc.gatech.edu/computing/Telecomm/mbone/.*** Released September 1, 1995. A tool to continuously collect MBone multicast group membership information including number and location of members, membership duration, and inter-arrival time for all audio and video sessions. The implementation required expertise in C, Tcl/Tk, the MBone tools, and UNIX socket programming.

1. ***Audio-on-Demand (AoD)***. March 1, 1995. A server/client prototype to demonstrate interactivity in near VoD systems. The AoD server provides songs-on-demand and VCR-like functions via multicast IP over Ethernet. The implementation required expertise in C, OpenWindows programming, UNIX socket programming, and network programming.

F. Tutorials, Panels and Invited Talks

- "25th Anniversary Panel," Network and Operating System Support for Digital Audio and Video (NOSSDAV), Portland, Oregon, USA, March 2015.

- "Sensing and Opportunistic Delivery of Ubiquitous Video in Health Monitoring, On-Campus and Social Network Applications," Workshop on Mobile Video Delivery (MoViD), Chapel Hill North Carolina, USA, February 2012.

- "Medium Access in New Contexts: Reinventing the Wheel?," USC Invited Workshop on Theory and

Practice in Wireless Networks, Los Angeles, California, USA, May 2008.

- "The Wild, Wild West: Wireless Networks Need a New Sheriff," University of Florida CISE Department Lecture Series, Gainesville, Florida, USA, February 2008.
- "Distinguishing Between Connectivity, Intermittent Connectivity, and Intermittent Disconnectivity," Keynote at the ACM MobiCom Workshop on Challenged Networks (CHANTS), Montreal, CANADA, September 2007.
- "The Three Ghosts of Multicast: Past, Present, and Future," Keynote at the Trans-European Research and Education Networking Association (TERENA) Networking Conference, Lynby, DENMARK, May 2007.
- "Multicast Help Wanted: From Where and How Much?," Keynote at the Workshop on Peer-to-Peer Multicasting (P2PM), Las Vegas, Nevada, USA, January 2007.
- "The Confluence of Wi-Fi and Apps: What to Expect Next," Engineering Insights, UC-Santa Barbara, Santa Barbara, California, USA, October 2006.
- "Challenges, Opportunities, and Implications for the Future Internet," University of Minnesota Digital Technology Center, Minneapolis, Minnesota, USA, September 2006.
- "Wireless Technology as a Catalyst: Possibilities for Next-Generation Interaction," Santa Barbara Forum on Digital Transitions, Santa Barbara, California, USA, April 2006.
- "Challenges and Opportunities in an Internet with Pervasive Wireless Access," University of Texas--Dallas Computer Science Colloquium, Dallas, Texas, USA, March 2006.
- "Challenges and Opportunities with Pervasive Wireless in the Internet," Duke University Computer Science Colloquium, Durham, North Carolina, USA, February 2006.
- "The Span From Wireless Protocols to Social Applications," Intel Research Labs, Cambridge, United Kingdom, December 2005.
- "The Internet Dot.Com Bomb and Beyond the Dot.Com Calm," CSE IGERT and Cal Poly Lecture Series, San Luis Obispo, California, USA, October 2005.
- "Panel: Directions in Networking Research," IEEE Computer Communications Workshop (CCW), Irvine, California, USA, October 2005.
- "Economic Incentives for Ad Hoc Networks," KAIST New Applications Seminar, Seoul, South Korea, March 2004.
- "New Applications for the Next Generation Internet," Citrix Systems, Santa Barbara, California, USA, March 2004.
- "PI: The Imperfect Pursuit of Pure Pattern," CITS Visions in Technology Series, Santa Barbara, California, USA, January 2004.
- "Panel: Core Networking Issues and Protocols for the Internet," National Science Foundation (NSF) Division of Advanced Networking Infrastructure and Research (ANIR) Principal Investigators Workshop, Washington DC, USA, March 2003.

- "Panel: Pricing for Content in the Internet," SPIE ITCom Internet Performance and Control of Network Systems, Boston, Massachusetts, USA, July 2002.
- "The Technology Behind Wireless LANs," Central Coast MIT Enterprise Forum, Santa Barbara, California, USA, March 2002.
- "Lessons Learned in the Digital Classroom," Center for Information and Technology Brown Bag Symposium, Santa Barbara, California, USA, March 2002.
- "The Evolution of Advanced Networking Services: From the ARPAnet to Internet2," California State University--San Luis Obispo CS Centennial Colloquium Series, San Luis Obispo, California, USA, February 2002.
- "Deployment of IP Multicast in Campus Infrastructures," Internet2 Campus Deployment Workshop, Atlanta, Georgia, USA, May 2001.
- "Multicast: Is There Anything Else to Do?," Sprint Research Retreat, Miami, Florida, USA, May 2001.
- "The Evolution of Next-Generation Internet Services and Applications," Government Technology Conference 2001 (GTC) for the Western Region, Sacramento, California, USA, May 2001.
- "I2 Multicast: Not WIDE-scale Deployment, FULL-scale Deployment," Closing Plenary, Internet2 Member Meetings, Washington, D.C., USA, March 2001.
- "Panel: Beyond IP Multicast," Content Delivery Networks (CDN), New York, New York, USA, February 2001.
- "Viable Multicast Pricing & Business Models for Wider-Scale Deployment," Content Delivery Networks (CDN), New York, New York, USA, February 2001.
- "IP Multicast: Modern Protocols, Deployment, and Management," Content Delivery Networks (CDN), New York, New York, USA, February 2001 & San Jose, California, USA, December 2001.
- "Under the Hood of the Internet," Technology 101: Technology for Investors, Center for Entrepreneurship & Engineering Management, November 2000.
- "Understanding Multicast Traffic in the Internet," (1) University of Virginia, (2) University of Maryland, and (3) Columbia University, September 2000.
- "The Bad, The Ugly, and The Good: The Past, Present, and Future of Multicast," Digital Fountain, San Francisco, California, USA, August 2000.
- "Implications of Source-Specific Multicast (SSM) on the Future of Internet Content Delivery," Occam Networks, Santa Barbara, California, USA, August 2000.
- "Introduction to Multicast Routing Protocols," UC-Berkeley Open Mash Multicast Workshop, Berkeley, California, USA, July 2000.
- "Efforts to Understand Traffic and Tree Characteristics," University of Massachusetts--Amherst Colloquia, Amherst, Massachusetts, USA, May 2000.
- "Monitoring Multicast Traffic," Sprint Research Retreat, Half Moon Bay, California, USA, April 2000.

- "What is the Next Generation of Multicast in the Internet?," HRL Laboratories, Malibu, California, USA, January 2000.

- "Mission and Status of the Center for Information Technology and Society (CITS)," Intel Research Council, Portland, Oregon, USA, September 1999.

- "Multicast at a Crossroads," IP Multicast Initiative Summits and Bandwidth Management Workshops, San Francisco, CA, USA, (1) October 1999; (2) February 2000; and (3) June 2000.

- "IP Multicast: Modern Protocols, Deployment, and Management," Networld+Interop: (1) Las Vegas, Nevada, USA--May 2000; (2) Tokyo, JAPAN--June 2000; (3) Atlanta, Georgia, USA--September 2000; (4) Las Vegas, Nevada, USA--May 2001; (5) Las Vegas, Nevada, USA--May 2002.

- "IP Multicast: Practice and Theory" (w/ Steve Deering), Networld+Interop: (1) Las Vegas, Nevada, USA--May 1999; (2) Tokyo, JAPAN--June 1999; and (3) Atlanta, Georgia, USA--September 1999.

- "Internet2 Multicast Testbeds and Applications," Workshop on Protocols for High Speed Networks (PfHSN), Salem, Massachusetts, USA, August 1999.

- "IP Multicast: Protocols for the Intra- and Inter-Domain," Lucent Technologies, Westford, Massachusetts, USA, August 1999.

- "Internet2 Multicast Testbeds and Applications," NASA Workshop: Bridging the Gap, Moffett Field, California, USA, August 1999.

- "The Evolution of Next-Generation Services and Applications in the Internet," Tektronix Distinguished Lecture Series, Portland, Oregon, USA, May 1999.

- "Multicast Applications and Infrastructure in the Next Generation Internet," CENIC 99 Workshop on Achieving Critical Mass for Advanced Applications, Monterey, California, USA, May 1999.

- "Multicast Traffic Monitoring and Analysis Work at UCSB" (w/ P. Rajvaidya), Workshop on Internet Statistics and Metrics Analysis (ISMA), San Diego, California, USA, April 1999.

- "How the Internet Works: Following Bits Around the World," Science Lite, Santa Barbara General Affiliates and Office of Community Relations, California, USA, February 1999.

- "Managing Multicast: Challenges, Tools, and the Future," IP Multicast Initiative Summit, San Jose, California, USA, February 1999.

- "The Future of Multicast Communication and Protocols," Internet Bandwidth Management Summit (iBAND), San Jose, California, USA, November 1998.

- "An Overview of IP Multicast: Applications and Deployment," (1) Workshop on Evaluating IP Multicast as the Solution for Webcasting Real-Time Networked Multimedia Applications, New York, New York, USA, July 1998; and (2) Satellites and the Internet Conference, Washington, D.C., USA, July 1998.

- "IETF Developments in IP Multicast," IP Multicast Initiative Summit, San Jose, California, USA, February 1998.

- "An Introduction to IP Multicast and the Multicast Backbone (MBone)" vBNS Technical Meeting

sponsored by the National Center for Network Engineering (NLANR), San Diego, California, USA, February 1998.

- "Using Multicast Communication to Deliver WWW Pages" Computer Communications Workshop (CCW '97), Phoenix, Arizona, USA, September 1997.

G. Research Funding

- K. Almeroth, "Packet Scheduling Using IP Embedded Transport Instrumentation," Cisco Systems Inc., $100,000, 3/1/13-8/31/14.
- K. Almeroth, E. Belding and S.J. Lee, "GOALI: Maximizing Available Bandwidth in Next Generation WLANs", National Science Foundation (NSF), $101,088, 10/1/13-9/30/14.
- K. Almeroth and E. Belding, "GOALI: Intelligent Channel Management in 802.11n Networks," National Science Foundation (NSF), $51,000, 10/1/10-9/30/11.
- B. Zhao, K. Almeroth, H. Zheng, and E. Belding, "NeTS: Medium: Airlab: Distributed Infrastructure for Wireless Measurements," National Science Foundation (NSF), $700,000, 9/1/09-8/13/13.
- K. Almeroth, E. Belding and T. Hollerer, "NeTS-WN: Wireless Network Health: Real-Time Diagnosis, Adaptation, and Management," National Science Foundation (NSF), $600,000, 10/1/07-9/30/10.
- K. Almeroth, "Next-Generation Service Engineering in Internet2," University Consortium for Advanced Internet Development (UCAID), $1,254,000, 7/1/04-6/30/09 (reviewed and renewed each year).
- B. Manjunath, K. Almeroth, F. Bullo, J. Hespanha, T. Hollerer, C. Krintz, U. Madhow, K. Rose, A. Singh, and M. Turk, "Large-Scale Multimodal Wireless Sensor Network," Office of Naval Research Defense University Research Instrumentation Program (DURIP), $655,174, 4/14/08-4/14/09.
- K. Almeroth and E. Belding, "Improving Robustness in Evolving Wireless Infrastructures," Intel Corporation, $135,000, 7/1/06-6/30/09 (reviewed and renewed for second and third year).
- K. Almeroth and K. Sarac, "Bridging Support in Mixed Deployment Multicast Environments," Cisco Systems Inc., $100,000, 9/1/07-8/31/08.
- K. Sarac and K. Almeroth, "Building the Final Piece in One-to-Many Content Distribution," Cisco Systems Inc., $95,000, 9/1/06-8/31/07.
- E. Belding, K. Almeroth and J. Gibson, "Real-Time Communication Support in a Ubiquitous Next-Generation Internet," National Science Foundation (NSF), $900,000, 10/1/04-9/30/07.
- K. Almeroth and K. Sarac, "Improving the Robustness of Multicast in the Internet," Cisco Systems Inc., $80,000, 9/1/04-8/31/05.
- R. Mayer, B. Bimber, K. Almeroth and D. Chun, "Assessing the Pedagogical Implications of Technology in College Courses," Mellon Foundation, $350,000, 7/1/04-6/30/07.
- B. Bimber, A. Flanagin and C. Stol, "Technological Change and Collective Association: Changing

Relationships Among Technology, Organizations, Society and the Citizenry," National Science Foundation (NSF), $329,175, 7/1/04-6/30/07.

- K. Almeroth and B. Bimber, "Plagiarism Detection Techniques and Software," UCSB Instructional Development, $22,000, 7/1/04-6/30/05.
- K. Almeroth, "Student Travel Support for the 14th International Workshop on Network and Operating Systems Support for Digital Audio and Video (NOSSDAV)," National Science Foundation (NSF), $10,000, 5/1/04-8/31/04.
- K. Almeroth, "An Automated Indexing System for Remote, Archived Presentations," QAD Inc., $25,000, 5/1/04-6/30/05.
- K. Almeroth and M. Turk, "A Remote Teaching Assistant Support System," Microsoft, $40,000, 1/1/04-6/30/05.
- K. Almeroth, "Supporting Multicast Service Functionality in Helix," Real Networks, $30,000, 9/1/03-6/30/04.
- K. Almeroth and E. Belding, "Service Discovery in Mobile Networks," Nokia Summer Research Grant (U. Mohan), $10,240, 7/1/03-9/30/03.
- K. Almeroth, D. Zappala, "Building a Global Multicast Service," Cisco Systems Inc., $100,000, 1/1/03-6/30/04.
- K. Almeroth, "Developing A Dynamic Protocol for Candidate Access Router Discovery," Nokia Graduate Student Fellowship (R. Chalmers), $26,110, 9/01/02-6/30/03.
- B. Bimber and K. Almeroth, "The Role of Collaborative Groupware in Organizations," Toole Family Foundation, $182,500 ($20,000 cash plus $162,500 in software), 9/1/02-8/30/07.
- B. Manjunath, et al., "Digital Multimedia: Graduate Training Program in Interactive Digital Multimedia," National Science Foundation (NSF), $2,629,373, 4/1/02-3/31/07.
- J. Green, K. Almeroth, et al., "Inquiry in the Online Context: Learning from the Past, Informing the Future," UCSB Research Across Disciplines, $10,000, 9/1/01-8/31/02.
- K. Almeroth, "Monitoring and Maintaining the Global Multicast Infrastructure," Cisco Systems Inc., $54,600, 7/1/01-6/30/02.
- R. Kemmerer, K. Almeroth, et al., "Hi-DRA High-speed, Wide-area Network Detection, Response, and Analysis," Department of Defense (DoD), $4,283,500, 5/1/01-4/30/06.
- A. Singh, K. Almeroth, et al., "Digital Campus: Scalable Information Services on a Campus-wide Wireless Network," National Science Foundation (NSF), 1,450,000, 9/15/00-12/31/04.
- K. Almeroth, "Visualizing the Global Multicast Infrastructure," UC MICRO w/ Cisco Systems Inc., $85,438, 7/1/00-6/30/02.
- H. Lee, K. Almeroth, et al., "Dynamic Sensing Systems," International Telemetering Foundation, $260,000, 07/01/00-06/30/04.
- B. Bimber and K. Almeroth, "Funding for the Center on Information Technology and Society,"

$250,000 from Dialogic (an Intel Company) and $250,000 from Canadian Pacific.

- K. Almeroth, "CAREER: From Protocol Support to Applications: Elevating Multicast to a Ubiquitous Network Service," National Science Foundation (NSF), $200,000, 9/1/00-8/31/04.
- K. Almeroth, "Characterizing Multicast Use and Efficiency in the Inter-Domain," Sprint Advanced Technology Laboratories, $62,500, 3/1/00-6/30/01.
- K. Almeroth, "Producing the Next Generation of Multicast Monitoring and Management Protocols and Tools," UC MICRO w/ Cisco Systems Inc., $124,500, 7/1/99 - 6/30/01.
- K. Almeroth, "Utilizing Satellite Links in the Provision of an Inter-Wide Multicast Service," HRL Laboratories, $20,000, 7/1/99 - 6/30/00.
- T. Smith, K. Almeroth, et al., "Alexandria Digital Earth Prototype," National Science Foundation, $5,400,000, 4/1/99-3/31/04.
- V. Vesna, K. Almeroth, et al., "Online Public Spaces: Multidisciplinary Explorations in Multi-User Environments (OPS:MEME), Phase II," UCSB Research Across Disciplines, $50,000, 9/1/98-8/31/99.
- K. Almeroth, "Techniques and Analysis for the Provision of Multicast Route Management," UC MICRO w/ Cisco Systems Inc., $97,610, 7/1/98 - 6/30/00.
- K. Almeroth, "Capturing and Modeling Multicast Group Membership in the Multicast Backbone (MBone)," UC MICRO w/ Hughes Research Labs, $19,146, 7/1/98 - 12/31/99.
- K. Almeroth, "Building a Content Server for the Next Generation Digital Classroom," UCSB Faculty Research Grant, $5,000, 7/1/98-6/31/99.

H. Research Honors and Awards

- IEEE Fellow Status, 2013
- Finalist for Best Paper Award, IEEE Conference on Sensor and Ad Hoc Communications and Networks (SECON), June 2008
- Best Paper Award, Passive and Active Measurement (PAM) Conference, April 2007
- Outstanding Paper Award, World Conference on Educational Multimedia, Hypermedia & Telecommunications (ED MEDIA), June 2006
- IEEE Senior Member Status, 2003
- Finalist for Best Student Paper Award, ACM Multimedia, December 2002
- Outstanding Paper Award, World Conference on Educational Multimedia, Hypermedia & Telecommunications (ED MEDIA), June 2002
- Computing Research Association (CRA) Digital Government Fellowship, 2001
- National Science Foundation CAREER Award, 2000
- Best Paper Award, 7th International World Wide Web Conference, April 1998

III. Service

A. Professional Activities

1. Society Memberships

Member, Association for Computing Machinery (ACM): 1993-present
Member, ACM Special Interest Group on Communications (SIGComm): 1993-present
Fellow, Institute of Electrical and Electronics Engineers (IEEE): 1993-present
Member, IEEE Communications Society (IEEE ComSoc): 1993-present
Member, American Society for Engineering Education (ASEE): 2003-2006

2. Review Work for Technical Journals and Publishers

NSF CISE research proposals, IEEE/ACM Transactions on Networking, IEEE/ACM Transactions on Computers, IEEE/ACM Transactions on Communications, IEEE Transactions on Circuits and Systems for Video Technology, IEEE Transactions on Parallel and Distributed Systems, IEEE Transactions on Multimedia, IEEE Communications, IEEE Communications Letters, IEEE Network, IEEE Internet Computing, IEEE Multimedia, IEEE Aerospace & Electronics Systems Magazine, ACM Transactions on Internet Technology, ACM Transactions on Multimedia Computing, Communications and Applications, ACM Computing Surveys, ACM Computer Communications Review, ACM Computeres in Entertainment, ACM/Springer Multimedia Systems Journal, AACE Journal of Interactive Learning (JILR), International Journal of Computer Mathematics, Journal of Communications and Networks, Journal of Parallel and Distributed Computing, Journal of Network and Systems Management, Journal of High Speed Networking, Journal of Communications and Networks, Journal on Selected Areas in Communications, Journal of Wireless Personal Communications, Personal Mobile Communications, Annals of Telecommunications, International Journal of Wireless and Mobile Computing, Pervasive and Mobile Computing (PMC), Wireless Networks Journal, Computer Networks Journal, Cluster Computing, Computer Communications, Mobile Computing and Communications Review, Performance Evaluation, Software--Practice & Experience, Information Processing Letters, ACM Sigcomm, ACM Multimedia, ACM Network and System Support for Digital Audio and Video Workshop (NOSSDAV), ACM Sigcomm Workshop on the Economics of Peer-to-Peer Systems (P2PEcon), ACM Sigcomm Workshop on Challenged Networks (CHANTS), IEEE Infocom, IEEE Globecom, IEEE Global Internet (GI) Symposium, IEEE Globecom Automatic Internet Symposium, IEEE Globecom Internet Services and Enabling Technologies (IS&ET) Symposium, IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM), IEEE International Conference on Network Protocols (ICNP), IEEE Conference on Sensor and Ad Hoc Communications and Networks (SECON), IEEE International Conference on Multimedia and Exposition (ICME), IEEE International Conference on Communications (ICC), IEEE International Conference on Parallel and Distributed Systems (ICPADS) IEEE International Symposium on High-Performance Distributed Computing (HPDC), IEEE International Conference on Distributed Computing Systems (ICDCS), IEEE International Workshop on Quality of Service (IWQoS), IEEE/IFIP Network Operations and Management Symposium (NOMS), IFIP/IEEE International Symposium on Integrated Network Management (IM), IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS), IEEE Aerospace & Electronics Systems Magazine, SPIE Conference on Multimedia Computing and Networking (MMCN), IFIP

Networking, IASTED International Conference on Information Systems and Databases (ISD), IASTED International Conference on Communications, Internet, and Information Technology, IASTED International Conference on Internet and Multimedia Systems and Applications (IMSA), IASTED International Conference on European Internet and Multimedia Systems and Applications (EuroIMSA), IASTED International Conference on Communications and Computer Networks (CCN), IASTED International Conference on Software Engineering and Applications (SEA), International Conference on Computer and Information Science (ICIS), International Association for Development of the Information Society (IADIS) International Conference on the WWW/Internet, Workshop on Network Group Communication (NGC), International Conference on Next Generation Communication (CoNEXT), International Conference on Parallel Processing (ICPP), International Conference on Computer Communications and Networks (IC3N), International Workshop on Hot Topics in Peer-to-Peer Systems (Hot-P2P), International Workshop on Wireless Network Measurements (WiNMee), International Workshop on Incentive-Based Computing (IBC), International Workshop on Multi-hop Ad Hoc Networks (REALMAN), International Workshop on Broadband Wireless Multimedia: Algorithms, Architectures and Applications (BroadWIM), International Packet Video (PV) Workshop, High Performance Networking Conference (HPN), International Parallel Processing Symposium (IPPS), International Symposium on Innovation in Information & Communication Technology (ISIICT), Workshop on Coordinated Quality of Service in Distributed Systems (COQODS), Pearson Education (Cisco Press) Publishers, Macmillan Technical Publishing, and Prentice Hall Publishers.

3. Conference Committee Activities

Journal/Magazine Editorial Board

IEEE Transactions on Mobile Computing (TMC): 2006-2011, 2017-2020 (Associate Editor-in-Chief)
IEEE Networking Letters: 2018-2021
IEEE Transactions on Network and Service Management (TNSM): 2015-2021
Journal of Network and Systems Management (JNSM): 2011-present
IEEE/ACM Transactions on Networking (ToN): 2003-2009, 2013-2017
ACM Computers in Entertainment: 2002-2015
IEEE Network: 1999-2012
AACE Journal of Interactive Learning Research (JILR): 2003-2012
IEEE Transactions on Mobile Computing (TMC): 2006-2011
ACM Computer Communications Review (CCR): 2006-2010

Journal/Magazine Guest Editorship

IEEE Journal on Selected Areas in Communications (JSAC) Special Issue on "Delay and Disruption Tolerant Wireless Communication", June 2008
Computer Communications Special Issue on "Monitoring and Measuring IP Networks", Summer 2005
Computer Communications Special Issue on "Integrating Multicast into the Internet", March 2001

Conference/Workshop Steering Committee

IEEE International Conference on Network Protocols (ICNP): 2007-present
ACM Sigcomm Workshop on Challenged Networks (CHANTS): 2006-present

IEEE Global Internet (GI) Symposium: 2005-2013, 2018-present
International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV): 2001-2020, 2005-2011 (chair), 2012-2020 (co-chair)
IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS): 2005-2009

Conference/Workshop Chair

International Conference on Communication Systems and Networks (COMSNETS): 2014 (co-chair)
ACM International Conference on Next Generation Communication (CoNext): 2013 (co-chair)
ACM RecSys News Recommender Systems (NRS) Workshop and Challange: 2013 (co-chair)
ACM Sigcomm Workshop on Challenged Networks (CHANTS): 2006 (co-chair)
IEEE International Conference on Network Protocols (ICNP): 2003 (co-chair), 2006
International Workshop on Wireless Network Measurements (WiNMee): 2006 (co-chair)
IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS): 2002 (co-chair)
International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV): 2002 (co-chair), 2003 (co-chair)
IEEE Global Internet (GI) Symposium: 2001 (co-chair), 2018 (co-chair)
International Workshop on Networked Group Communication (NGC): 2000 (co-chair)

Program Chair

International Conference on Computer Communication and Networks (ICCCN): 2015 (Track co-chair) International Conference on Communication Systems and Networks (COMSNETS): 2010
IEEE International Conference on Network Protocols (ICNP): 2008 (co-chair)
IEEE Conference on Sensor and Ad Hoc Communications and Networks (SECON): 2007 (co-chair)
IFIP Networking: 2005 (co-chair)

Posters/Demonstrations Chair

ACM Sigcomm: 2012 (co-chair)

Student Travel Grants Chair

ACM Sigcomm: 2010 (co-chair)

Publicity Chair

IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS): 2004 (co-chair)

Keynote Chair

IEEE Infocom: 2005 (co-chair)

Local Arrangements Chair

Internet2 "Field of Dreams" Workshop: 2000

Tutorial Chair

ACM Multimedia: 2000
IEEE International Conference on Network Protocols (ICNP): 1999

Panel/Session Organizer

NSF ANIR PI 2003 Panel on "Core Networking Issues and Protocols for the Internet"
CCW 2001 Session on "Multicast/Peer-to-Peer Networking"
NOSSDAV 2001 Panel on "Multimedia After a Decade of Research"
NGC 2000 Panel on "Multicast Pricing"

Technical Program Committee

IEEE International Conference on Network Protocols (ICNP): 1999, 2000, 2001, 2003, 2004, 2005, 2006, 2007, 2008, 2009 (Area Chair), 2010 (Area Chair), 2011 (Area Chair), 2012 (Area Chair), 2013, 2014 (Area Chair), 2015 (Area Chair), 2016 (Area Chair), 2017 (Area Chair), 2018 (Area Chair), 2019 (Area Chair), 2020 (Area Chair), 2021 (Area Chair)
International Workshop on Network and Operating System Support for Digital Audio and Video (NOSSDAV): 2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019
ACM Multimedia (MM): 2001, 2003, 2004, 2005 (short paper), 2006, 2007, 2008, 2008 (short paper), 2010, 2011, 2012, 2013, 2015, 2016, 2017, 2018, 2019, 2023, 2024
IEEE Conference on Sensor and Ad Hoc Communications and Networks (SECON): 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011 (Area Chair), 2012 (Area Chair), 2013, 2014 (Area Chair), 2015, 2016 (Area Chair), 2017, 2018, 2019
IEEE/IFIP Network Operations and Management Symposium (NOMS): 2004, 2006, 2010
IEEE Infocom: 2004, 2005, 2006, 2008, 2009, 2010 (Area Chair), 2011 (Area Chair), 2012 (Area Chair)
IFIP Networking: 2004, 2005, 2006, 2007, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2022
IEEE International Conference on Communications (ICC) Next Generation Networking and Internet Symposium (NGNI): 2018, 2019
ACM Workshop on Mobile Video (MoVid): 2014, 2015, 2016, 2017
ACM Student Research Competition (SRC) Grand Finals: 2014
Mobile and Social Computing for Collaborative Interactions (MSC): 2014
IEEE Conference on Communications and Network Security (CNS): 2013
IEEE International Symposium on a World of Wireless, Mobile and Multimedia Networks (WoWMoM): 2005, 2006, 2007, 2008, 2009, 2010
ACM Sigcomm Workshop on Challenged Networks (CHANTS): 2006, 2008, 2009, 2010, 2011, 2012, 2016, 2017, 2018, 2019
IEEE International Conference on Distributed Computing Systems (ICDCS): 2006, 2010, 2011, 2012, 2013
International Workshop on Wireless Network Measurements (WiNMee): 2006, 2008, 2010
ACM Sigcomm: 2004 (poster), 2008 (poster), 2010
IEEE International Conference on Computer Communication and Networks (IC3N): 2008, 2009, 2010, 2011, 2012
International Conference on Communication Systems and Networks (COMSNETS): 2009, 2010, 2011, 2012, 2013
International Conference on Sensor Networks (SENSORNETS): 2012

International Workshop on Social and Mobile Computing for Collaborative Environments (SOMOCO): 2012
Workshop on Scenarios for Network Evaluation Studies (SCENES): 2009, 2010, 2011
ACM Multimedia Systems (MMSys): 2010, 2011, 2012, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022
IEEE Internation Symposium on Multimedia (ISM): 2016
IEEE International Conference on Pervasive Computing and Communications (PerCom): 2010
IEEE Wireless Communications and Networking Conference (WCNC): 2010, 2011
ACM International Symposium on Mobility Management and Wireless Access (MobiWac): 2010, 2011
International Conference on Computing, Networking and Communications, Internet Services and Applications Symposium (ICNC-ISA): 2012, 2013
IEEE WoWMoM Workshop on Hot Topics in Mesh Networking (HotMesh): 2010, 2011, 2012, 2013
IEEE Workshop on Pervasive Group Communication (PerGroup): 2010
ACM International Conference on Next Generation Communication (CoNEXT): 2005, 2006, 2007, 2009, 2012
IEEE International Conference on Broadband Communications, Networks, and Systems (BroadNets) Wireless Communications, Networks and Systems Symposium: 2007, 2008, 2009
IEEE International Conference on Broadband Communications, Networks, and Systems (BroadNets) Internet Technologies Symposium: 2007, 2008, 2009
International Workshop on Mobile and Networking Technologies for Social Applications (MONET): 2008, 2009
Extreme Workshop on Communication-The Midnight Sun Expedition (ExtremeCom): 2009
IEEE International Workshop on Cooperation in Pervasive Environments (CoPE): 2009
International Workshop on the Network of the Future (FutureNet): 2009, 2010, 2011, 2012
IEEE International Conference on Multimedia and Exposition (ICME): 2010
SPIE Conference on Multimedia Computing and Networking (MMCN): 2004, 2008
ACM Sigcomm Workshop on the Economics of Networks, Systems, and Computation (NetEcon): 2008
IEEE International Conference on Communications (ICC): 2008
IEEE International Conference on Mobile Ad-hoc and Sensor Systems (MASS): 2008
IFIP/IEEE International Symposium on Integrated Network Management (IM): 2005, 2007
Global Internet (GI) Symposium: 2001, 2002, 2004, 2006, 2007, 2022, 2023
IEEE/ACM International Conference on High Performance Computing (HiPC): 2007
ACM International Symposium on Mobile Ad Hoc Networking and Computing (MobiHoc): 2007
IEEE Workshop on Embedded Systems for Real-Time Multimedia (ESTIMedia): 2007
IEEE/IFIP Wireless On Demand Network Systems and Services (WONS): 2007
IFIP/IEEE International Conference on Management of Multimedia Networks and Services (MMNS): 2001, 2002, 2003, 2004, 2005, 2006
IASTED International Conference on European Internet and Multimedia Systems and Applications (EuroIMSA): 2004, 2006
IEEE International Conference on Parallel and Distributed Systems (ICPADS): 2005, 2006
IEEE Globecom Internet Services and Enabling Technologies (IS&ET) Symposium: 2006
International Workshop on Incentive-Based Computing (IBC): 2006
IEEE International Workshop on Quality of Service (IWQoS): 2006, 2014, 2015

International Workshop on Multi-hop Ad Hoc Networks (REALMAN): 2006
IEEE Globecom Automatic Internet Symposium: 2005
ACM Sigcomm Workshop on the Economics of Peer-to-Peer Systems (P2PEcon): 2005
International Conference on Parallel Processing (ICPP): 2001, 2003, 2004
International Packet Video (PV) Workshop: 2002, 2003, 2004
IEEE International Symposium on High-Performance Distributed Computing (HPDC): 2004
International Workshop on Broadband Wireless Multimedia: Algorithms, Architectures and Applications (BroadWIM): 2004
International Symposium on Innovation in Information & Communication Technology (ISIICT): 2004
Workshop on Coordinated Quality of Service in Distributed Systems (COQODS): 2004
IASTED International Conference on Networks and Communication Systems (NCS): 2004
IASTED International Conference on Communications, Internet, and Information Technology (CIIT): 2004
IASTED International Conference on Internet and Multimedia Systems and Applications (IMSA): 2003, 2004
International Workshop on Networked Group Communication (NGC): 1999, 2000, 2001, 2002, 2003
International Association for Development of the Information Society (IADIS) International Conference on the WWW/Internet: 2003
International Conference on Computer and Information Science (ICIS): 2003
Human.Society@Internet: 2003
IASTED International Conference on Communications and Computer Networks (CCN): 2002
The Content Delivery Networks (CDN) Event: 2001
IP Multicast Initiative Summit: 1998, 1999, 2000
Corporation for Education Network Initiatives in California (CENIC): 1999
Internet Bandwidth Management Summit (iBAND): 1998, 1999

B. Technical Activities

1. Working Groups

Internet2 Working Group on Multicast, Chair: 1998-2005
IEEE Communications Society Internet Technical Committee (ITC), Conference Coordinator: 2000-2004
IETF Multicast Directorate (MADDOGS), Member: 1999-2001
IASTED Technical Committee on the Web, Internet and Multimedia, Member: 2002-2005
Internet Engineering Task Force (IETF), various working groups: 1995-present

2. Meeting Support Work

Internet Engineering Task Force MBone broadcasts: 1995-2005
Conference MBone broadcasts: Sigcomm '99, and '00
Interop+Networld Network Operations Center (NOC) Team Member: 1995-1997

ACM Multimedia technical staff: 1994

C. University of California Committees

1. Department of Computer Science Committees

Public Relations: 2005-2006 (chair 2005-2006), 2009-2011 (chair 2009-2011)
Strategic Planning: 2000-2002, 2003-2006, 2009-2011
Undergraduate Advising and Affairs: 2006-2007, 2014-2015
Vice Chair: 2000-2005
Graduate Admissions: 2000-2005 (chair 2000-2005), 2011-2012
Graduate Affairs: 2000-2005 (co-chair 2000-2005)
Teaching Administration: 2000-2005
Facilities: 1997-2001 (chair 1999-2000), 2006-2007
External Relations: 1999-2002
Computer Engineering Public Relations: 2011-2012
Computer Engineering Awards: 2011-2012
Computer Engineering Administration/Recruiting: 1998-2001
Computer Engineering Lab and Computer Support: 1998-2001
Faculty Recruiting: 1999-2002
Graduate Advising: 1998-1999, 2000-2005

2. University Committees

Member, Campus Budget and Planning: 2013-2015
Faculty, Cognitive Science Program: 2006-2020
Faculty, Technology Management Program (TMP): 2003-2014
Faculty, Media Arts and Technology (MAT) Program: 1998-2014
Faculty, Computer Engineering Degree Program: 1998-2020
Steering Committee, Center for Information Technology and Society (CITS): 2012-2020
Associate Director, Center for Information Technology and Society (CITS): 1999-2012
Member, Campus Committee on Committees: 2010-2013
Member, Campus Income and Recharge Committee: 2010-2013
Member, College of Engineering Executive Committee: 2010-2012 (chair 2011-2012), 2014-2015 (chair 2014-2015)
Member, Distinguished Teaching Award Committee: 2009, 2010, 2011
Member, Campus Classroom Design and Renovation Committee: 2003-2010
Member, ISBER Advisory Committee: 2008-2011
Member, Fulbright Campus Review Committee: 2007
Member, Faculty Outreach Grant Program Review Committee: 2007
Executive Vice Chancellor's Information Technology Fee Committee: 2005-2006
Council on Research and Instructional Resources: 2003-2006
Executive Vice Chancellor's Working Group on Graduate Diversity: 2004-2005
Member, Engineering Pavillion Planning Committee: 2003-2005
Information Technology Board: 2001-2004
Executive Committee, Center for Entrepreneurship & Engineering Management (CEEM): 2001-2004

3. System Wide Committees

UCSB Representative to the Committee on Information Technology and Telecommunications Policy (ITTP): 2003-2005
UCSB Representative to the Executive Committee, Digital Media Innovation (DiMI): 1998-2003

D. Georgia Tech Committees and Service (while a graduate student)

Graduate Student Body President: 1994-1995
Georgia Tech Executive Board: 1994-1995
Georgia Tech Alumni Association Executive Committee: 1994-1995
Dean of Students National Search Committee: 1995
Institute Strategic Planning Committee: 1994-1996

Cases in last 4 years I have been deposed or testified at hearing/trial:

- A deposition in Finjan, Inc. v. SonicWall, Inc. (5:17-cv-04467-BLF-HRL, N. D. Cal.). 10/2019-10/2020.
- Depositions and trial testimony in TQ Delta, LLC v. 2Wire, Inc. (1:13-cv-01835-RGA, D. Del.). 03/2017-11/2020.
- A deposition in Linksmart Wireless Technology, LLC v. Gogo, LLC and Panasonic Avionics Corp (8:18-cv-00654-JAK-JDE and 8:18-cv-00662-JAK-JDE). 02/2020-12/2020.
- A deposition and trial testimony in Certain Audio Players and Controllers, Components, Thereof and Products Containing the Same (ITC Inv. No. 337-TA-1191) [Sonos, Inc. v. Google LLC and Alphabet, Inc.]. 11/2019-02/2021.
- A deposition in Finjan, Inc. v. Cisco Systems, Inc. (5:17-cv-00072-BLF-SVK, N. D. Cal). 02/2019-02/2021.
- A deposition and trial testimony in Gigamon, Inc. v. Apcon, Inc. (2:19-cv-300-JRG, E. D. Tex.). 09/2019-04/2021.
- A deposition in Certain IP Camera Systems including Video Doorbells and Components Thereof (US ITC Inv. No. 337-TA-1242) [SkyBell Technologies, Inc., SB IP Holdings, LLC, and Eyetalk365, LLC v. SimpliSafe, Inc., Arlo Technologies, Inc., and Vivint Smart Home, Inc.]. 02/2021-09/2021.
- A deposition in Warner Records, Inc. et al. v. Charter Communications, Inc. (19-cv-00874-RBJ-MEH, D. Colo.). 11/2019-10/2021.
- A deposition and trial testimony in VideoShare, LLC v. Google LLC (6:19-cv-00663-ADA, W. D. Tex.). 06/2021-11/2021.
- A deposition in The Chamberlain Group, LLC v. Overhead Door Corp. (2:21-cv-0084, E. D. Tex.). 11/2021-12/2021.
- Depositions in Contour IP Holding, LLC v. GoPro, Inc. (17-cv-04738-WHO, N. D. Cal.). 10/2019-12/2021.
- A deposition in Chewy, Inc. v. International Business Machines Corporation (1:21-cv-1319-JSR, S. D. N. Y.). 04/2021-02/2022.
- A deposition in Flexiworld Technologies, Inc. v. Roku, Inc. (6:20-cv-00819-ADA, W. D. Tex.). 10/2021-02/2022.
- A deposition in Proven Networks, LLC v. NetApp, Inc. (6:20-cv-00369-ADA, W. D. Tex.). 08/2020-03/2022.
- Trial testimony in Two Way Media LTD v. Telefonica (517/2017-X, Barcelona, Spain). 12/2015-05/2022.
- A deposition and claim construction hearing testimony in Peloton Interactive, Inc. v. Icon Health and Fitness, Inc. (1:20-cv-00662-RGA, D. Del.). 10/2020-05/2022.
- Depositions in Icon Health and Fitness, Inc. v. Peloton Interactive, Inc. (20-1386-RGA, D. Del.). 10/2020-05/2022.

- A deposition and hearing testimony in UMG Recordings, Inc., et al. v. Bright House Networks, LLC (8:19-cv-00710-MSS-TGW, M. D. Fla.). 11/2019-05/2022.
- A deposition in Inter Partes Review of U.S. Patent Nos. 9,860,198 (IPR2021-00882) and 10,728,192 (IPR2021-00883) [Meta Platforms, Inc. v. Wrinkl Inc.]. 12/2021-06/2022.
- Depositions in TQ Delta, LLC v. AdTran, Inc. (14-cv-954-RGA, 15-cv-121-RGA, D. Del). 03/2017-06/2022.
- Depositions in Inter Partes Review of U.S. Patent Nos. 8,166,081 (IPR2021-01267), 8,688,028 (IPR2021-01303), 8,903,307 (IPR2021-01305), and 8,200,203 (IPR2021-01371) [Hyundai Motor America v. StratosAudio, Inc.]. 06/2021-08/2022.
- A deposition and trial testimony in Shopify, Inc. v. Express Mobile, Inc. (1:19-cv-00439-RGA, D. Del.). 05/2020-08/2022.
- A deposition in FirstFace Co, LTD v. Apple, Inc (3:18-cv-02245-JD, N. D. Cal.). 05/2022-11/2022.
- Depositions in Inter Partes Review of U.S. Patent Nos. 9,291,475 (IPR2022-00708 and IPR2023-00031); 9,602,608 (IPR2022-00709); 7,484,008 (IPR2022-00857); and 6,832,283 (IPR2022-0970) [Toyota Motor Corp. and American Honda Motor Co, Inc. v. Intellectual Ventures II LLC]. 01/2022-02/2023.
- A deposition and trial testimony in Express Mobile, Inc. v. GoDaddy.com, LLC (1:19-cv-01937-RGA, D. Del.). 05/2020-03/2023.
- A deposition in Inter Partes Review of U.S. Patent No. 9,182,231 (IPR2022-00586) [Qualcomm Inc. v. FedEx Corporate Services, Inc.]. 09/2021-04/2023.
- A deposition in WebRoot, Inc. and Open Text, Inc. v. Trend Micro, Inc. (22-cv-00239-ADA-DTG, W. D. Tex.). 06/2022-04/2023.
- Depositions and trial testimony in Sonos, Inc. v. Google LLC (6:20-cv-881-ADA, W. D. Tex.; 3:20-cv-06754-WHA, N. D. Cal.; and 3:21-cv-07559-WHA, N. D. Cal.). 11/2019-05/2023.
- A deposition in Inter Partes Review of U.S. Patent No. 8,072,968 (IPR2022-00890) [IBM Corp. v. Ebates Performance Marketing, Inc.]. 06/2022-05/2023.
- Depositions and trial testimony in Personal Audio, LLC v. Google, Inc. (1:17-cv-01751-VAC-CJB, D. Del). 03/2018-06/2023.
- A deposition and trial testimony in Centripetal Networks, Inc. v. Cisco Systems, Inc. (2:18-cv-00094, E. D. Va.). 01/2019-06/2023.
- A deposition in Orckit Corp v. Cisco Systems, Inc. (2:22-cv-276, E. D. Tex.). 05/2023-06/2023.
- A deposition and trial testimony in Touchstream Technologies, Inc. v. Google, LLC (6:21-cv-00569-ADA, W. D. Tex.). 08/2022-07/2023.
- A deposition in Inter Partes Review of U.S. Patent No. 8,784,113 (IPR2022-01439) [Go1 Pty, Ltd. v. OpenSesame, Inc.]. 01/2022-09/2023.

- A deposition and trial testimony in SB IP Holdings, LLC v. Vivint Smart Home, Inc. (4:20-cv-00886-ALM, E. D. Tex.). 12/2021-10/2023.
- Depositions and trial testimony in Alacritech, Inc. v. Centurylink Communications LLC; Winstron Corporation, Dell, Inc. (2:16-cv-693-RWS, 2:16-cv-692-RWS, 2:16-cv-695-RWS, E. D. Tex.). 04/2016-10/2023.
- A deposition in Inter Partes Review of U.S. Patent Nos. 9,503,498 (IPR2023-00185); 9,516,091 (IPR2023-00186); and 8,924,457 (IPR2023-00187) [Bright Data LTD v. Oxylabs, UAB]. 06/2020-11/2023.
- Trial testimony in GoodRx, Inc. v. Famulus Health LLC (AAA Ref. No. 01-23-000-5919). 06/2023-11/2023.
- A deposition in Entropic Communications LLC v. Charter Communications, Inc. (2:22-cv-00125-JRG, E. D. Tex.). 03/2023-12/2023.
- Depositions in Post-Grant Review of U.S. Patent No. 10,782,951 (PGR2021-00096) and 11,157,256 (PGR2022-00053) [IronSource Ltd. v. Digital Turbine, Inc.]. 05/2021-12/2023.
- Trial testimony in Certain Wi-Fi Routers, Wi-Fi Devices, Mesh Wi-Fi Network Devices, and Hardware and Software Components Thereof (US ITC Inv. No. 337-TA-1361) [Netgear v. TP-Link]. 05/2023-01/2024.
- A deposition in Certain Fitness Devices, Streaming Components Thereof, and Systems Containing Same (US ITC Inv. No. 337-TA-1265E) [iFit Inc., FreeMotion Fitness, Inc. and NordicTrack, Inc. v. DISH DBS Corporation, DISH Technologies LLC, and Sling TV LLC]. 10/2023-02/2024.
- Depositions in IBM Corp. v. Rakuten, Inc. and Ebates Performance Marketing, Inc. (21-461-VAC, D. Del.). 06/2022-06/2024.
- A deposition and trial testimony in Omnitracs, LLC v. Platform Science, Inc. (3:20-cv-0958-CAB-DDL, S. D. Cal.). 05/2023-07/2024.
- A deposition and trial testimony in International Business Machines Corp v. Zynga, Inc. (22-590-GBW, D. Del.). 08/2023-09/2024.
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- A deposition in STA Group, LLC v. Motorola Solutions, Inc. (2:22-cv-00381-JRG-RSP, E. D. Tex.). 05/2023-present.
- A deposition in NEC Corporation v. Peloton Interactive, Inc. (1-22-cv-00987-CJB, D. Del.). 08/2023-present.
- A deposition in Antonio McKinney et al. v. Corsair Gaming, Inc. (3:22-cv-00312-CRB, N. D. Cal.). 07/2023-present.
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- A deposition in Touchstream Technologies, Inc. v. Comcast Cable Communications, LLC (2:23-cv-00062-JRG, E. D. Tex.). 01/2024-present.
- Depositions in STA Group LLC v. Motorola Solutions, Inc. (2:22-cv-00030-JRG-RSP, E. D. Tex.). 04/2024-present.
- A deposition in Time Warner Cable Enterprises, LLC v. Nokia of America Corp. (650748/2022, IAS Part 43, N. Y.). 01/2024-present.
- A deposition in Robocast, Inc. v. Netflix, Inc. (1:22-cv-00305-RGA, D. Del.). 07/2022-present.
- A deposition in NetSocket, Inc. v. Cisco Systems, Inc. (2:22-cv-00172-JRG, E. D. Tex.). 09/2022-present.

XVII. APPENDIX B

List of Materials Considered

Patents and File Histories
U.S. Patent No. 10,762,002 and file history
U.S. Patent No. 10,795,832 and file history
U.S. Patent No. 10,904,103 and file history
U.S. Patent No. 11,258,676 and file history
U.S. Patent No. 11,403,237 and file history
U.S. Patent No. 11,422,951 and file history

IPRs:
IPR2024-01436 – U.S. Patent No. 10,762,002
IPR2024-01437 – U.S. Patent No. 11,403,237
IPR2024-01438 – U.S. Patent No. 11,258,676
IPR2024-01439 – U.S. Patent No. 11,422,951

Pleadings:
Complaint, dated November 14, 2023
Answer, Affirmative Defenses, and Counterclaims, dated May 18, 2024
Defendants' Third Amended Answer and Affirmative Defenses, dated March 12, 2025

Discovery:
Plaintiffs' First Set of Interrogatories to Defendants, dated May 8, 2024
Defendants' Responses and Objections to Plaintiffs' First Set of Interrogatories (Nos. 1-10), dated June 7, 2024
Defendants' Responses and Objections to Plaintiffs' Second Set of Interrogatories (Nos. 11-14), dated July 7, 2024
Plaintiffs' Responses and Objections to Defendants' First Set of Interrogatories (Nos. 1-8), dated August 2, 2024
Defendants' First Supplemental and Amended Responses and Objections to Plaintiffs' First Set of Interrogatories (Nos. 1–10), dated December 9, 2024
Defendants' Responses to Plaintiffs' First Set of Requests for Admissions, dated January 17, 2025
Plaintiffs' Responses and Objections to Defendants' Second Set of Interrogatories (Nos. 9-16), dated January 27, 2025
Plaintiffs' Supplemental Responses and Objections to Defendants' First Set of Interrogatories (Nos. 1, 5,6), dated March 19, 2025
Defendants' Responses and Objections to Plaintiffs' Third Set of Interrogatories (Nos. 15-16), dated April 10, 2025
Plaintiffs' Responses and Objections to Defendants' First Set of Request for Admission (Nos. 1-40), dated April 18, 2025
Defendants' First Supplemental and Amended Responses and Objections to Plaintiffs' Fourth Set of Interrogatories (Nos. 17–19), dated April 18, 2025

Defendants' First Supplemental Responses and Objections to Plaintiffs' Second Set of Interrogatories (Nos. 11-14), dated April 18, 2025
Defendants' Second Supplemental and Amended Responses and Objections to Plaintiffs' First Set of Interrogatories (Nos. 1-10), dated April 18, 2025

Expert Reports:
Expert Report of William B. Scally, CFA, dated April 28, 2024
Expert Report of Michael C. Brogioli, Ph.D., dated April 27, 2024

Disclosures:
Plaintiffs' Initial and Additional disclosures, dated April 15, 2025
Plaintiffs' First Amended Initial and Additional Disclosures, dated February 26, 2025
Plaintiffs' Second Amended Initial and Additional Disclosures, dated April 17, 2025

Depositions:
Deposition Transcript of Dunxiong Cai, dated April 13, 2025
Deposition Transcript of Wesley Lightcap, dated April 23, 2025
Deposition Transcript of [redacted], dated April 18, 2025
Deposition Transcript of Erwin Six, dated, dated April 25, 2025

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Japanese Patent Application Publication No. 2008-165007 (“Uchida”)
Japanese Patent Application Publication No. 2007-208606 (“Maeda”)

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U.S. Patent Application Publication No. 2010/0295994 ("Kaplan")
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